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National Toxicology Program

Review of Current DHHS, DOE, and EPA Research Related to Toxicology

Fiscal Year 1987

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service

ORIGINAL

NOTES TO THE READER

Availability

The National Toxicology Program (NTP) Review of Current DHHS, DOE, and EPA Research Related to Toxicology for Fiscal Year 1987 may be obtained by writing or calling:

Public Information Office
National Toxicology Program
P. O. Box 12233
Research Triangle Park, NC 27709
(919-541-3991; FTS 629-3991)

Errors or Omissions

Although every effort is made to ensure that the Review is error free, mistakes may occur. Any errors or omissions noted by the reader in the body of the Review, the appendices or the indexes, should be called to the attention of:

Dr. Larry G. Hart
National Toxicology Program
P. O. Box 12233
Research Triangle Park, NC 27709
(919-541-3971; FTS 629-3971)

Questions of Additional Information

Questions or requests for information about the Review and the National Toxicology Program should be addressed to Dr. Larry Hart (see above). For more information about a specific program area or activity contact should be made with the appropriate agency contact noted in the Appendix. Contact persons are listed alphabetically in the Appendix along with their telephone numbers.

If readers of the Review are aware of planned or ongoing studies on chemicals mentioned in the Review, they are encouraged to make such information known to the performing agency or to the NTP, so that unnecessary duplicative studies can be avoided or minimized.

NATIONAL TOXICOLOGY PROGRAM

REVIEW OF CURRENT DHHS, DOE, AND EPA RESEARCH RELATED TO TOXICOLOGY

FISCAL YEAR 1987

NTP-87-002

AUGUST 1987

NATIONAL TOXICOLOGY PROGRAM
PUBLIC HEALTH SERVICE
DEPARTMENT OF HEALTH AND HUMAN SERVICES

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL TOXICOLOGY PROGRAM

Review of Current DHHS, DOE, and EPA Research Related to Toxicology

TABLE OF CONTENTS

Introduction---1

Methods and Overview---1

Findings---3

Department of Health and Human Services (DHHS) Agencies' Role in the Support of Toxicology Research, Testing, and Methods Development---15

- National Cancer Institute---16
- National Institute of Environmental Health Sciences---19
- Food and Drug Administration---28
- Centers for Disease/National Institute for Occupational Safety and Health---31
- Centers for Disease/Center for Environmental Health---34
- National Eye Institute---37
- National Heart, Lung, and Blood Institute---38
- National Institute of Allergy and Infectious Diseases---39
- National Institute of Diabetes and Digestive and Kidney Diseases--- 40
- National Institute of Arthritis and Musculoskeletal and Skin Diseases--- 41
- National Institute of Child Health and Human Development--- 42
- National Institute of Dental Research--- 44
- National Institute of General Medical Sciences--- 45
- National Institute of Neurological and Communicative Disorders and Stroke--- 46
- National Institute on Aging--- 48
- National Library of Medicine--- 49
- Division of Research Resources--- 54
- Division of Research Services--- 56
- Alcohol, Drug Abuse, and Mental Health Administration--- 57

Department of Energy (DOE) Role in the Support of Toxicology Research, Testing, and Methods Development---61

Environmental Protection Agency (EPA) Role in the Support of Toxicology Research, Testing, and Methods Development---65

Toxicology Methods Currently Being Developed by DHHS, DOE, and EPA---73

TABLE OF CONTENTS (Continued)

National Cancer Institute--- 74
National Institute of Environmental Health Sciences--------------------- 82
Food and Drug Administration-- 93
Centers for Disease Control/National Institute for
  Occupational Safety and Health--126
Centers for Disease Control/Center for Environmental Health-------------129
National Institute of Mental Health---------------------------------------133
Department of Energy--134
Environmental Protection Agency---138

Chemical Compounds Currently Being Tested by DHHS, DOE, and EPA for Toxicological Properties

Introduction to Tables and Indices--------------------------------------- 1

Agencies Testing Chemicals

National Cancer Institute--- 2
National Institute of Environmental Health Sciences-------------------11
Food and Drug Administration--44
Centers for Disease Control/National Institute for
  Occupational Safety and Health--------------------------------------58
National Institute of Child Health and Human
  Development---59
National Heart, Lung, and Blood Institute-----------------------------66
National Institute of Diabetes and
  Digestive and Kidney Diseases---------------------------------------73
National Institute of Allergy and Infectious Diseases----------------79
National Institute of Arthritis and Musculoskeletal
  and Skin Diseases---81
National Institute of Neurological and Communicative
  Disorders and Stroke--83
National Eye Institute--97
National Institute of Dental Research--------------------------------101
Division of Research Services--102
National Institute of Mental Health----------------------------------103
National Institute on Drug Abuse-------------------------------------104
Department of Energy---105
Environmental Protection Agency--------------------------------------106

Chemical Index by Name---119

CAS Registry Number Index--147

Chemical Index by Study Type---159

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TABLE OF CONTENTS (Continued)

Appendix: Requests to DHHS, DOE, and EPA for Information on Toxicology-Related Research

Request to DHHS Agencies-- 1

Request to DOE-- 7

Request to EPA-- 8

Addressees--- 9

Agency Contact Persons---11

LIST OF TABLES

Table 1 Summary of FY 1987 Estimates of Support by DHHS, DOE, and EPA for Research Related to Chemical Toxicology---------- 5

Table 2 FY 1987 Summary Estimates of Funding Support by DHHS, DOE, and EPA for Research Related to Chemical Toxicology in Basic Research, Testing and Methods Development---------- 7

Table 3 FY 1987 Estimates of Funding Support by DHHS Agencies for Research Related to Chemical Toxicology in Basic Research, Testing and Methods Development---------- 8

Table 4 FY 1987 Summary Estimates of Personnel Support by DHHS, DOE, and EPA for Research Related to Chemical Toxicology in Basic Research, Testing and Methods Development----------11

Table 5 FY 1987 Estimates of Personnel Support by DHHS Agencies for Research Related to Chemical Toxicology in Basic Research, Testing and Methods Development----------12

DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL TOXICOLOGY PROGRAM

Review of Current DHHS, DOE, and EPA Research Related to Toxicology for Fiscal Year 1987

INTRODUCTION

Five of the six Public Health Service agencies support research related to toxicology. Within the National Institutes of Health (NIH) alone, twelve separate institutes and several other components support relevant research. Toxicology-related research is also conducted by other Federal agencies -- particularly the Department of Energy (DOE) and the Environmental Protection Agency (EPA). Altogether the Department of Health and Human Services (DHHS), DOE and EPA will spend nearly $430 million in this area in FY 1987.

Sixty-one percent of this sum will be spent by the four charter agencies of the National Toxicology Program (NTP): the Food and Drug Administration, the National Cancer Institute, the National Institute of Environmental Health Sciences, and the National Institute for Occupational Safety and Health. Toxicology related research is central to their missions.

However, these agencies contribute only a portion of their resources to NTP, and critical work is carried on by other agencies. Thus, an overall review is of considerable interest to research managers for purposes of coordinating research and reducing unnecessary duplication. The charter of the National Toxicology Program (NTP) requires its Annual Plan to include a review of current DHHS research related to toxicology. This is the ninth review responding to this requirement. For the seventh time a survey of similar research at DOE and the EPA is included.

METHODS AND OVERVIEW

· METHODS

The review covers projections for Fiscal Year 1987, made by September, 1986 and based on the President's proposed budget. It represents responses by agencies of DHHS,* and by DOE and EPA, to requests by the Director of NTP for information on agency programs in basic toxicology research, toxicology testing, and toxicology methods development.

Although the review covers thoroughly the activities of critical components** of DHHS, DOE, and EPA in support of toxicology-related research, it does not include information on related activities supported by other Federal

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*See Appendix for request. Only those DHHS agencies which previously indicated program activity in basic toxicology research, testing, or methods development were contacted for the FY 1987 report.

**The DOE response covered primarily the Health Effects Research Division of the Office of Health and Environmental Research. The EPA response covered the Office of Health Research, Office of Research and Development.

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agencies such as the Department of Agriculture, the Department of Commerce, the Department of Interior, and the Department of Defense. In dollar amounts, however, the combined DHHS, DOE, and EPA role in toxicology-related research is estimated to be significantly greater than that of all remaining Federal agencies. Thus, this review reflects a substantial portion of total Federal support for this activity.

The following definitions were used in order to compile the data for this review:

Basic Toxicology Research -- Studies which provide information on adverse effects and fate of chemicals in biological systems including modifying factors. For example, studies which characterize the structure and/or function of biological systems are not appropriate for inclusion, unless the objective of the studies is to provide a frame of reference or baseline for detecting or understanding alterations in structure and/or function as a measure of chemical toxicity. Studies on how exogenous chemicals may modify structure/function are appropriate. Similarly, studies on normal DNA synthesis should not be included, but studies on DNA repair mechanisms are included.

Toxicology Testing -- Studies which provide information on the adverse effects of chemicals in biological systems using established test protocols. This includes chemicals being tested in vitro and in vivo in laboratory organisms as well as human epidemiological studies related to chemical exposure. Included are preclinical studies and Phase I clinical trials on the toxicity of chemotherapeutic agents. Studies dealing with adverse drug reactions are also appropriate for inclusion.

Toxicology Methods Development -- Studies aimed at developing and/or validating new methods, procedures, protocols, etc., for toxicology testing purposes.

Specifically excluded by definition from the review is the toxicology of physical environmental factors such as noise, light, ionizing and non-ionizing radiation.

• OVERVIEW

Information on dollar and manpower support for agency activities in basic toxicology research, toxicology testing, and toxicology methods development, by DHHS, DOE and EPA, is summarized on pages three to 14.

Narrative information provided by agencies on their role in support of toxicology research, testing, and methods development begins on page 17.

A number of agencies support programs which aim to develop and improve toxicology testing methodology. The development of faster, more reliable, and more predictive (of adverse health effects) tests is a central function of the National Toxicology Program. Therefore, all agencies were requested to provide summary information on their programs related to toxicology methods development, whether essential or peripheral to their missions. The information provided in response to this request is summarized in tables on pages 74 to 149.

Information was also requested from agencies on chemical compounds currently being studied for their toxicological properties in intramural laboratories, or on contracts, or through grants. This information is summarized in tables on pages 1 to 118.* It should be recognized that in some instances, testing for toxicologic properties is incidental to the main purpose of a project, or the agency mission. Thus, the inclusion of lists of compounds from these agencies is for information purposes only, and does not necessarily indicate involvement in or commitment to a program of toxicology testing.

FINDINGS

• AGENCY CONTRIBUTIONS TO TOXICOLOGY-RELATED RESEARCH

The overall support provided by DHHS, DOE, and EPA for chemical toxicology-related research, and that portion provided to the National Toxicology Program (NTP) is summarized in Table 1.**

As shown in this table, DHHS, DOE, and EPA estimate a total of approximately $430 million in toxicology-related research in FY 1987. Approximately $264 million of this figure or 61%, will be spent by the four charter agencies of the National Toxicology Program: FDA, NCI, NIEHS, and NIOSH. They will contribute about $73 million, or 28% of their relevant fundings to NTP research.

The total expenditure by DHHS, DOE, and EPA in FY 1987 represents a 5.2% increase over FY 1986. Eleven agencies reported increases, five reported decreases and two reported no change in funding. Additionally, two new NIH institutes were formed from the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases (NIADDK) with the estimated aggregate spending for the two new institutes being slightly higher than that estimated for NIADDK in FY 1986. The proportion represented by the NTP charter agencies increased by 4% from FY 1986. Overall, the DHHS agencies collectively estimate a 6.5% increase over FY 1986; the DOE estimates a 4.9% increase in FY 1987, while EPA projects a decrease of about 4.7%.

Table 1 also summarizes DHHS and EPA estimates of professional staff time involved in chemical toxicology-related research activities in FY 1987. DHHS agencies estimate approximately 888.7 intramural staff-years in FY 1987 (a decrease of 2% over 1986), while EPA projects about 289 staff-years (no change from FY 1986). Comparable figures are not available from DOE. DHHS agencies will contribute approximately 247 intramural staff-years to research projects under the National Toxicology Program, about an 8% decrease over FY 1986.

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*Section of the Review on Chemical Testing.

**Funding estimates in Tables 1 to 3 do not include Superfund dollars that the NTP receives under an interagency agreement with the Agency for Toxic Substances and Disease Registry. This funding, approximately 4.7 million dollars in FY 1987, provides for toxicological testing of chemicals that have been identified in priority hazardous waste sites pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

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• HOW THESE CONTRIBUTIONS ARE ALLOCATED

Tables 2 and 3 divide the support in FY 1987 for toxicology-related research among basic research, chemical testing, and methods development.

Tables 2 and 3 show that approximately $219 million (51% of the total DHHS-DOE-EPA funding) will support basic research projects, $156 million (36%) will support toxicology testing, and $54 million (13%) will support toxicology methods development. This represents a stable allocation of resources among these critical program areas. The total estimated FY 1987 direct contribution of $73 million to the NTP represents approximately 17% of total DHHS, DOE, and EPA support for toxicology-related research, little change from FY 1986.

More than one-third of the total funding available for toxicology methods development and testing is contributed to the NTP. Of the total $156 million estimated for toxicology testing in FY 1987, the NTP agencies will control $94 million (60%), and will contribute about $57 million to the NTP. Similarly, the NTP agencies account for 60% of the $55 million for toxicology methods development, of which about $15 million will be contributed to the Program.

The largest portion of Federal funding is devoted to basic toxicology research. Of the total $430 million spent by DHHS, DOE and EPA in FY 1987, an estimated $219 million (or 51%) will be devoted to basic research. Of this figure, $140 million (or 64%) is controlled by the NTP charter agencies.

Finally, Tables 4 and 5 divide DHHS and EPA intramural staff-years among the categories of basic research, testing, and methods development. Overall, there was a slight decrease (2%) projected in staff-year allocations for DHHS agencies between FY 1986 and FY 1987. For EPA, there was no change projected in FY 1987 over FY 1986 estimates.

The remainder of this review consists of narrative and tabular information provided by the DHHS agencies, DOE, and EPA on their respective roles in the support of toxicology research, testing, and methods development.*

The reader should be aware that many of the toxicology research, testing and methods development activities for the three current NTP participating agencies (NCTR, NIEHS and NIOSH), which are summarized in the Review, are described more fully in the companion volume, the FY 1987 NTP Annual Plan. The Annual Plan may be obtained without charge by contacting:

NTP Public Information Office
MD B2-04
P.O. Box 12233
Research Triangle Park, NC 27709
Telephone: (919) 541-3991; FTS 629-3991

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* Tabular information on toxicology methods development and toxicology testing supported by the Division of Research Resources (DRR), NIH, is not available in a form suitable for inclusion in the Review. For specific information on DRR activities in these areas, an agency contact with telephone number is given in the back of the Appendix.

TABLE 1: SUMMARY

FY 1987 ESTIMATES OF SUPPORT BY DHHS, DOE, AND EPA FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY[1]

	$ in thousands		intramural professional staff-years	
	Total	NTP[2]	Total	NTP[2]
DEPARTMENT OF HEALTH AND HUMAN SERVICES	376,640	73,268	888.7	246.7
National Toxicology Program Agencies	264,341	73,268	725.7	246.7
National Cancer Institute/NIH	95,462	-0-	69	-0-
National Institute of Environmental Health Sciences/NIH	135,099	68,600	308	176
Food and Drug Administration	30,065	953	284.0	6
National Institute for Occupational Safety and Health/CDC	3,715	3,715	64.7	64.7
National Institutes of Health	95,658	-0-	109.2	-0-
National Eye Institute	3,751	-0-	4.6	-0-
National Heart, Lung, and Blood Institute	8,300	-0-	22.0	-0-
National Institute of Allergy and and Infectious Diseases	2,633	-0-	-0-	-0-
National Institute of Arthritis and Musculoskeletal and Skin Diseases	805	-0-	1.0[3]	-0-
National Institute of Diabetes and Digestive and Kidney Diseases	3,740	-0-	36.1[3]	-0-
National Institute of Child Health and Human Development	7,384	-0-	11	-0-
National Institute of Dental Research	644	-0-	0.47	-0-
National Institute of General Medical Sciences	8,069	-0-	-0-	-0-
National Institute of Neurological and Communicative Disorders and Stroke	36,751	-0-	33	-0-
National Institute on Aging	-0-	-0-	-0-	-0-
National Library of Medicine	-0-	-0-	-0-	-0-
Division of Research Resources	23,521	-0-	-0-	-0-
Division of Research Services	60	-0-	1	-0-
Centers for Disease Control				
Center for Environmental Health	2,149	-0-	48.2	-0-
Alcohol, Drug Abuse, and Mental Health Administration	14,492	-0-	5.6	-0-
National Institute of Mental Health	1,084	-0-	2.0	-0-

TABLE 1: SUMMARY (CONTINUED)

FY 1987 ESTIMATES OF SUPPORT BY DHHS, DOE, AND EPA FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY[1]

	$ in thousands		intramural professional staff-years	
	Total	NTP[2]	Total	NTP[2]
National Institute on Alcohol Abuse and Alcoholism	13,014	-0-	3.6	-0-
National Institute on Drug Abuse	394	-0-	-0-	-0-
DEPARTMENT OF ENERGY	10,044	-0-	*	-0-
ENVIRONMENTAL PROTECTION AGENCY	43,106	-0-	289.3	-0-
TOTALS	429,790	73,268	1,178.0	246.7

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[1] Based on the FY 1987 President's proposed budget.
[2] Figures indicate projected commitments to NTP for FY 1987.
[3] Based on actual FY 1985 intramural staff-years.
*Figures not available.

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TABLE 2

FY 1987 SUMMARY ESTIMATES OF FUNDING SUPPORT BY DHHS, DOE, AND EPA FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING AND METHODS DEVELOPMENT[1]

($ in thousands)

	Basic Research	Testing	Methods Development	Total
Department of Health and Human Services	212,869.8	130,072.7	33,697.0	376,639.5
Department of Energy[2]	5,921	2,756	1,367	10,044
Environmental Protection Agency[3,4]	-	22,743.6	20,362.2	43,105.8

---

[1] Based on the FY 1987 President's proposed budget.

[2] Most toxicology related research is sponsored and administered by the Health Effects Research Division of the Office of Health and Environmental Research.

[3] Toxicology related research is conducted by the Office of Health Research of the Office of Research and Development. Dollar estimates do not include the following support activities: OHR Headquarters support, Task Force on Environmental Cancer and Heart and Lung Disease, and Health Effects Institute.

[4] The primary purpose of the research is not to provide basic scientific information, but rather to meet specific regulatory or programmatic needs.

TABLE 3

FY 1987 ESTIMATES OF FUNDING SUPPORT BY DHHS AGENCIES FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING AND METHODS DEVELOPMENT[1]

($ in thousands)

	Basic Research		Testing		Methods Development		Total	
National Toxicology Program Agencies	139,690.8	1,437.8[2]	93,748.7	56,823.7[2]	33,050	15,006.5[2]	266,489.5	73,268[2]
National Institutes of Health	122,970	0	86,365	54,900	21,226	13,700	230,561	68,600
National Cancer Institute	58,699	0	31,465[3]	0	5,298	0	95,462	0
National Institute of Environmental Health Sciences	64,271	0	54,900	54,900	15,928	13,700	135,099	68,600
Food and Drug Administration	15,164	0	5,207	953	9,693.5	0	30,064.5	953
Center for Drugs and Biologics	350		-0-		-0-		350	
Center for Food Safety and Applied Nutrition	2,885		2,800		500		6,185	
Center for Devices and Radiological Health	-0-		16.0		127.5		143.5	
Center for Veterinary Medicine	436		23		424		883	
National Center for Toxicological Research	11,493	0	2,368	953	8,642	0	22,503	953
Centers for Disease Control	1,556.8	1,437.8	2,176.7	970.7	2,130.5	1,306.5	5,864	3,715
Center for Environmental Health	119		1,206		824		2,149	
Center for Health Promotion and Education	-0-		-0-		-0-		-0-	
Center for Infectious Diseases	-0-		-0-		-0-		-0-	
Center for Prevention Services	-0-		-0-		-0-		-0-	
Center for Professional Development and Training	-0-		-0-		-0-		-0-	
National Institute for Occupational Safety and Health	1,437.8	1,437.8	970.7	970.7	1,306.5	1,306.5	3,715	3,715

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[1] Based on the FY 1987 President's proposed budget.

[2] Figures indicate projected commitments to NTP for FY 1987.

[3] This amount includes support for pre-clinical screening and testing of chemotherapeutic agents not specifically for toxicity ($25,965) as well as toxicity testing ($2,400). In addition, it includes Phase I trials ($3,100).

TABLE 3 (CONTINUED)

FY 1987 ESTIMATES OF FUNDING SUPPORT BY DHHS AGENCIES FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING AND METHODS DEVELOPMENT[1]

($ in thousands)

	Basic Research	Testing	Methods Development	Total
National Institutes of Health	58,687	36,324	647	95,658
National Eye Institute	3,751	-0-	-0-	3,751
National Heart, Lung, and Blood Institute	4,980	3,320	-0-	8,300
Heart and Vascular Diseases Program	945	630	-0-	1,575
Lung Diseases Program	2,681	1,788	-0-	4,469
Blood Diseases and Blood Resources Program	334	222	-0-	556
Intramural Research	1,020	680	-0-	1,700
National Institute of Allergy and Infectious Diseases	53	2,580	-0-	2,633
National Institute of Arthritis and Musculoskeletal and Skin Diseases	204	601	-0-	805
National Institute of Diabetes and Digestive and Kidney Diseases	1,230	2,510	-0-	3,740
National Institute of Child Health and Human Development	1,828	5,556	-0-	7,384
Center for Population Research	189	3,445	-0-	3,634
Center for Research on Mothers and Children	1,639	2,111	-0-	3,750
National Institute of Dental Research	644	-0-	-0-	644

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[1] Based on the FY 1987 President's proposed budget.

TABLE 3 (CONTINUED)

FY 1987 ESTIMATES OF FUNDING SUPPORT BY DHHS AGENCIES FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING AND METHODS DEVELOPMENT[1]

($ in thousands)

	Basic Research	Testing	Methods Development	Total
National Institute of General Medical Sciences	8,069	-0-	-0-	8,069
Genetics Program	3,320	-0-	-0-	3,320
Pharmacological Sciences Program	4,749	-0-	-0-	4,749
National Institute of Neurological and Communicative Disorders and Stroke	27,159	9,592	-0-	36,751
National Institute on Aging	-0-	-0-	-0-	-0-
National Library of Medicine	-0-	-0-	-0-	-0-
Division of Research Resources	10,709	12,165	647	23,521
Division of Research Services	60	-0-	-0-	60
Alcohol, Drug Abuse, and Mental Health Administration	14,492	-0-	-0-	14,492
National Institute of Mental Health	1,084	-0-	-0-	1,084
National Institute on Alcohol Abuse and Alcoholism	13,014	-0-	-0-	13,014
National Institute on Drug Abuse	394	-0-	-0-	394
TOTALS	212,869.8	130,072.7	33,697.0	376,639.5

---

[1] Based on FY 1987 President's proposed budget.

TABLE 4

FY 1987 SUMMARY ESTIMATES OF PERSONNEL SUPPORT BY DHHS, DOE, AND EPA FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING, AND METHODS DEVELOPMENT[1]

(in intramural professional staff-years)

	Basic Research	Testing	Methods Development	Total
Department of Health and Human Services	471.9	239.1	177.7	888.7
Department of Energy	*	*	*	*
Environmental Protection Agency[2,3]	-	146.6	142.7	289.3

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[1] Based on the FY 1987 President's proposed budget.

*Figures not available.

[2] Toxicology related research is conducted by the Office of Health Research of the Office of Research and Development. Staff-year estimates do not include Headquarters support.

[3] The primary purpose of the research is not to provide basic scientific information, but rather to meet specific regulatory or programmatic needs.

TABLE 5

FY 1987 ESTIMATES OF PERSONNEL SUPPORT BY DHHS AGENCIES FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING, AND METHODS DEVELOPMENT[1]

(in intramural professional staff-years)

	Basic Research		Testing		Methods Development		Total	
National Toxicology Program Agencies	381.0	22.2[2]	215.2	125.9[2]	177.7	98.6[2]	773.9	245.7[2]
National Institutes of Health	185	0	106	102	86	74	377	176
National Cancer Institute	60	0	4	0	5	0	69	0
National Institute of Environmental Health Sciences	125	0	102	102	81	74	308	176
Food and Drug Administration	171.1	0	64.3	6	48.6	0	284.0	6
Center for Drugs and Biologics	6.5		0		0		6.5	
Center for Food Safety and Applied Nutrition	48.6		54.8		10.0		113.4	
Center for Devices and Radiological Health	0		1.5		6.6		8.1	
Center for Veterinary Medicine	12		0		5		17.0	
National Center for Toxicological Research	104	0	8	6	27	0	139.0	6
Centers for Disease Control	24.9	22.2	44.9	17.9	43.1	24.6	112.9	64.7
Center for Environmental Health	2.7		27		18.5		48.2	
Center for Health Promotion and Education	-0-		-0-		-0-		-0-	
Center for Infectious Diseases	-0-		-0-		-0-		-0-	
Center for Professional Development and Training	-0-		-0-		-0-		-0-	
National Institute for Occupational Safety and Health	22.2	22.2	17.9	17.9	24.6	24.6	64.7	64.7

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[1] Based on the FY 1987 President's proposed budget.

[2] Figures indicate projected commitments to NTP for FY 1987.

TABLE 5 (CONTINUED)

FY 1987 ESTIMATES OF PERSONNEL SUPPORT BY DHHS AGENCIES FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING, AND METHODS DEVELOPMENT[1]

(in intramural professional staff-years)

	Basic Research	Testing	Methods Development	Total
National Institutes of Health	85.3	23.9	-0-	109.2
National Institute of Child Health and Human Development	11	-0-	-0-	11
National Institute of General Medical Sciences	-0-	-0-	-0-	-0-
National Institute of Neurological and Communicative Disorders and Stroke	22	11	-0-	33
National Institute of Arthritis and Musculoskeletal and Skin Diseases	-0-	1.0[2]	-0-	1[2]
National Institute of Diabetes and Digestive and Kidney Diseases	30.7[2]	5.4[2]	-0-	36.1[2]
Division of Research Resources	-0-	-0-	-0-	-0-
National Heart, Lung, and Blood Institute	16.0	6.0	-0-	22.0
National Institute of Dental Research	-0-	0.47	-0-	0.47
National Eye Institute	4.6	-0-	-0-	4.6
National Institute on Aging	-0-	-0-	-0-	-0-
National Institute of Allergy and Infectious Diseases	-0-	-0-	-0-	-0-
National Library of Medicine	-0-	-0-	-0-	-0-
Division of Research Services	1	-0-	-0-	1

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[1] Based on the FY 1987 President's proposed budget.
[2] Based on actual FY 1985 intramural staff-years.

TABLE 5 (CONTINUED)

FY 1987 ESTIMATES OF PERSONNEL SUPPORT BY DHHS AGENCIES FOR RESEARCH RELATED TO CHEMICAL TOXICOLOGY IN BASIC RESEARCH, TESTING, AND METHODS DEVELOPMENT[1]

(in intramural professional staff-years)

	Basic Research	Testing	Methods Development	Total
Alcohol, Drug Abuse, and Mental Health Administration	5.6	-0-	-0-	5.6
National Institute of Mental Health	2.0	-0-	-0-	2.0
National Institute on Alcohol Abuse and Alcoholism	3.6	-0-	-0-	3.6
National Institute on Drug Abuse	-0-	-0-	-0-	-0-
TOTALS	471.9	239.1	177.7	888.7

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[1] Based on the FY 1987 President's proposed budget.

DHHS AGENCIES' ROLE IN THE SUPPORT OF TOXICOLOGY RESEARCH, TESTING AND METHODS DEVELOPMENT

NATIONAL CANCER INSTITUTE

Overview

The goal of the National Cancer Institute is to develop the means for reducing the incidence, morbidity, and mortality of cancer in humans. Toward this goal, the NCI sponsors research in four major thrust areas, i.e., cause and prevention research, detection and diagnosis research, treatment research, and cancer biology. The thrust areas are broken down into research programs in epidemiology, physical and chemical carcinogenesis, biological carcinogenesis, nutrition, tumor biology, immunology, diagnostic research, preclinical treatment research, clinical treatment research, and rehabilitation research.

Each research program sponsors a broadly based effort within the confines of its mandate. In this context, toxicology-related research is an important component of a number of research programs. Such research includes the identification of populations at increased cancer risk attributable to various lifestyle factors such as dietary habits and smoking as well as to exposures to chemicals, investigations on the effects, biological fate and mechanisms of action of carcinogens and structurally similar compounds, development of new methods for detecting chemical carcinogens, studies on the toxicological and otner effects of potential cancer chemotherapeutic and chemopreventive agents, and clinical studies to characterize the toxicity of cancer chemotherapeutic agents.

Basic Toxicology Research

The program areas outlined below have been developed for the convenience of this report and do not necessarily correspond to any NCI research program defined for budgetary, organizational, or other purpose.

Carcinogenesis

Research in this program area is directed toward the elucidation of the biological fate of chemical carcinogens and the mechanisms by which they exert their effects. Basic research includes studies on the effects of tumor promoters, carcinogens and co-carcinogens on cell structure and function, the relationships between molecular structure and carcinogenic activity, enzyme systems associated with the metabolic activation of procarcinogens to carcinogenic forms and with the detoxification of carcinogens, the effects of the binding of carcinogens to DNA, and systems that repair DNA damage. Recently initiated studies are evaluating the possibility that chemical carcinogens and radiation induce malignant transformation through activation of cellular oncogenes. Studies are conducted in whole animal models, mammalian organ and cell culture (including human) systems, and in *in vitro* microbial and other submammalian systems.

Preclinical

Research in this program area is directed primarily toward the development of new antitumor drugs. Such drugs may include natural products, synthetic chemicals, microbial products and biological response modifiers. Basic research includes studies in biochemical pharmacology, drug metabolism, pharmacokinetics, drug interactions and drug resistance. Studies on the toxicity associated with radiotherapy and radiomimetic and radiosensitizing agents are also in progress. Studies have been initiated recently which are focused on the development of drugs effective for the treatment of AIDS. In the area of radiation toxicology, problems related to the late effects of radiation on normal animal tissues are being evaluated. Studies on the prevention of the acute and chronic adverse effects of antitumor agents, as well as prevention of their mutagenic and carcinogenic effects, are also underway. These studies are conducted at the whole body, cellular, and molecular levels. Research involving the screening of chemicals for antitumor activity is reported under Toxicology Testing.

Toxicology Testing

The areas outlined below have been developed for the convenience of this report and do not necessarily correspond to any NCI research program defined for budgetary, organizational, or other purpose.

Epidemiology

This program area is directed toward the identification of populations at increased cancer risk resulting from host factors, lifestyle factors and environmental or occupational exposures to chemical, physical or biological agents. Epidemiologic studies of selected occupational groups help to identify chemical and physical carcinogens, and studies of radiation-exposed groups clarify the shape of the dose-response curve. Other epidemiologic studies assess the late effects of treatment for childhood cancer, the effects of exogenous hormones, immunosuppressive and cytotoxic agents, and other drugs suspected of being carcinogenic. Analytic epidemiologic studies of suspected factors associated with risk of developing cancer are performed using worker populations in specific industries and trades. A major emphasis has been placed on biochemical and molecular epidemiology. This area involves the incorporation of newly-developed biochemical techniques into traditional epidemiologic investigations and the refinement of these procedures into safe, accurate, reliable and informative adjuncts to human investigations. These techniques are being used to accurately characterize exposure to environmental/occupational carcinogens and for identifying measures which may prevent or reverse the carcinogenic process. The primary goal in these investigations is to identify individuals at increased cancer risk by obtaining pathobiological evidence of high exposure of target cells to carcinogens and/or increased susceptibility due to inherited or acquired host factors.

Preclinical Screening

This program area is directed toward the development of new and more efficacious tumor and antiviral therapies. A broad spectrum of chemicals is screened for antitumor activity *in vitro* against human stem cells and animal tumor cells; subsequently, antitumor activity against a panel of animal tumors and human xenografts is assessed. Chemicals screened for activity include synthetic chemicals including radiosensitizers and radioprotectors, natural substances, biological response modifiers, and microbial products. Human tumor cell lines are also useful models for investigating drug resistence in human solid tumors.

Phase I Clinical Trials

This program area is directed toward the earliest clinical assessment of new antitumor drugs and drugs effective against retroviruses such as HTLV-III. It is responsible for establishing maximum tolerated doses at various test schedules. Studies also are conducted to determine if toxic effects are predictable, treatable, or reversible.

Toxicology Methods Development

The program areas outlined below have been developed for the convenience of this report and do not necessarily correspond to any NCI research program defined for budgetary, organizational, or other purpose.

In Vitro Model Systems

This program area is responsible for the development of short-term *in vitro* assays to provide a research tool for studying the mechanisms of action of chemical carcinogens and for developing strategies for prevention. The major models in use or under development include mammalian cell transformation assays, an isolated rat hepatocyte system, keratinocytes maintained in long-term cultures, mutagenicity in microorganisms, sister chromatid exchange and other chromosomal alterations in mammalian cells, and long-term culture of human bronchial, esophageal and other epithelial cells and tissue. Other models include *in vitro* studies of DNA repair following exposure to toxins and interactions between chemical carcinogens and target macromolecules.

Whole Animal Models

This program is responsible for developing and maintaining new animal models for use in carcinogenesis research. Models include inbred strains of mice genetically more sensitive or more resistant to tumor promoters and primate species for use in pharmacologic, toxicologic, and chemical carcinogenesis studies and in studies of transplacental carcinogenesis. An interesting new model system is transgenic mice, mice which are produced by the injection of specifically constructed oncogenes into fertilized mouse eggs. This system should prove useful for a variety of investigations, including studies of the genetic control of susceptibility to chemical, physical and biological carcinogens.

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Overview

The NIEHS has the broadest responsibility among Federal agencies for the support of research and the training of research manpower in the area of the effects of chemical environmental agents on human health. Its primary mission is to conduct and support biomedical research which will identify, characterize, and aid in preventing the adverse effects of chemical agents on human health. The research is essential to development of strategies and technologies which will prevent human disease caused by environmental agents.

Research activities generally fall into three separate but interrelated areas as follows:

1. Research aimed at identifying and understanding the fundamental processes through which environmental agents damage biological systems, providing a rational basis for devising of measures for detection of health effects and evaluation of their consequences.
2. Research aimed at the development, validation, and application of test systems which can detect and characterize the toxicity of chemical agents found in the environment.
3. Research activities which extend laboratory studies to risk assessment and epidemiology.

The NIEHS' research and development activities can be divided primarily between basic toxicology research and toxicology method development and validation. Most of the Institute's toxicology testing is conducted under the Division of Toxicology Research and Testing (the NIEHS component of the National Toxicology Program) through its collaborative research program (contracts and interagency agreements) especially in the areas of (a) carcinogenesis, (b) toxicologic characterization of effects other than carcinogenesis, and (c) genetic toxicologic effects. Epidemiological studies related to chemical exposure are largely effected through the intramural and collaborative research programs of the Division of Biometry and Risk Assessment.

The overall output of the NIEHS programs is intended to aid those agencies, organizations and individuals with responsibilities for developing and instituting pollution control regulations, or preventive and therapeutic measures for environmentally related diseases.

Basic Toxicology Research

NIEHS supports basic toxicology research aimed at identifying the toxicity of environmental chemicals, characterizing their metabolic fate, and gaining an understanding of the biological and biochemical mechanisms involved in environmentally related diseases. Research subjects range from population groups and whole organisms to molecules. This research may focus on effects and underlying scientific principles which apply to one or several organ systems, and tissues, or it may focus on disease states; e.g., carcinogenesis, mutagenesis, or teratogenesis, in specific target organs.

Research studies are conducted in the following areas:

1. Identifying, characterizing and quantifying, to the extent possible, the mutagenicity, teratogenicity, carcinogenicity and target organ toxicity of a wide variety of chemicals humans are exposed to in the home, workplace, and general environment. Included are heavy metals, air pollutants (gases, vapors and particulates with some emphasis on automotive combustion products), industrial organic solvents, chemicals associated with microelectronics, manufacturers such as arsine and gallium arsenide, polycyclic, aromatic and aliphatic hydrocarbons, polyhalogenated hydrocarbons (especially biphenyls, dioxins and furans), pesticides/herbicides, hormonally active chemicals such as DES, and natural toxins. Many of these chemical classes are subjects of the following types of investigations.

2. Pharmacological studies are being carried out to elucidate the relationships between the biotransformation and translocation of chemicals and toxicity in various target organs and cells of the body. In these studies pharmacological and pharmacokinetic concepts are being used to characterize the mechanisms by which environmental contaminants exert adverse biological effects. Included are studies: to evaluate species/sex/organ differences in distribution and activity of xenobiotic metabolizing enzyme systems; to determine the metabolic bases for selective/specific damage to certain organs and cell types which is characteristic of some toxins; to determine how hormonally active chemicals alter the normal functions of organ systems; to determine the role of membrane structure and function in toxicity and absorption, distribution and excretion of pollutants; to correlate organ and cell structure with function both before and after exposure to chemicals; and to provide reliable endpoints for the extrapolation of dose dependent chemical effects across animal species and to humans.

3. Studies on the morphological, biochemical and molecular mechanisms through which chemicals interact with biological receptors to produce toxic responses. Included are studies on the physicochemical interactions of chemicals, especially metals and hydrocarbons, with purified and isolated biological macromolecules as well as *in vivo*. Emphasis is placed on detection and identification of reactive free radicals generated from environmental chemicals, and on the interaction of light with chemical agents in biological systems to produce photosensitization.

4. Research on pulmonary system toxicology includes investigation of mechanisms of injury and repair resulting from exposure to pollutants, and study of the pathogenesis of specific disorders such as pulmonary fibrosis and emphysema. The various cellular and tissue alterations produced in pulmonary tissue by environmental carcinogens are being studied histochemically and ultrastructurally, as are the co-carcinogenic and fibrotic effects of asbestos and silica. Research continues on how the pulmonary system disposes of inhaled pollutants,

and how pulmonary defense mechanisms modify toxicity. Conversely, the effects of air pollutants on pulmonary defense mechanisms against microbial pathogens are being evaluated. Studies include detailed examinations of the activity and cellular location of enzyme systems in the lungs which activate and/or detoxify drugs and foreign chemicals. Pulmonary hypersensitivity to airborne industrial chemicals is being studied using guinea pigs as a model for humans.

5. Research in behavioral and neurological toxicology is aimed at detecting changes, especially early changes, in nervous system function produced by long-term, low level exposure of organisms to chemical factors in the environment, understanding underlying mechanisms, and examining conditions which may increase individual susceptibility to neurotoxicity. Approaches include studies on the neurobehavioral mechanisms involved in neuronal plasticity and adaptive responses to environmental agents. Special emphasis is given to studies during postnatal phases of development. Other studies are concerned with determining the biochemical bases for such toxicity. Included are studies on the Functional roles of neurotransmitters or neuromodulators (such as brain peptides) in central nervous sytems (CNS) adaptation following chemical insult, and the use of enzymes such as ornithine decarboxylase markers of toxic effects. There is continuing emphasis on characterizing the neurobehavioral effects of pesticides, especially organochlorines, and organometals.

6. Research in developmental and reproductive toxicology is concerned with the toxicological mechanisms associated with perturbations of processes leading to craniofacial teratogenesis, transplacental hormonal carcinogenesis, neurotoxin-induced neuroendocrine dysfunction, and failure of germ cell function. Considerable effort is being given to studying the development and teratogenic effects of heavy metals.

7. Research continues with other organs which are exposed to and/or play a role in the disposition of chemical toxicants.
   a) Liver - Of concern are the various aspects of hepatotoxicity emphasizing the more subtle alterations in liver function following exposure to environmental agents. Investigators are characterizing the role of endocrine action in the regulation of hepatic function in control and pollutant-treated animals, including the role of hormone receptors and toxicant-receptor interactions including tumor promotion. Other studies are aimed at elucidating the mechanisms by which chemicals, especially halogenated solvents, produce liver damage.

   b) Kidneys - Studies continue on the nephrotoxicology of halogenated aliphatic chemicals and heavy metals with the purpose of defining common cellular or subcellular mechanisms of action.

8. The NIEHS continued to serve in a focal role within NIH and DHHS for marine and freshwater biomedical research. Aquatic species serve to elucidate mechanisms of biological response to environmental

chemicals which may be applicable to better understanding of the human response. Other investigations concern a possible direct impact on human health by contaminants present in the aquatic environment (including drinking water) and accumulated by aquatic animals. Areas of research emphasis include use of aquatic species as simpler models for the study of human disease processes, e.g., studies of the effects of heavy metals on transport systems of epithelial membranes which model human renal, intestinal and hepatic epithelia. Aquatic species are examined for their suitability and sensitivity in toxicity testing, especially for carcinogenesis and mutagenesis.

9. Research in genetic toxicology focuses on evaluating the molecular nature of mutation and repair processes, characterizing the various types of mutational events produced, and isolating and characterizing mutant mammalian proteins and enzymes in urine and other fluids which may serve as markers for chemically-induced mutations in laboratory test systems. Efforts continue to determine the mutagenic and carcinogenic mechanisms of various known mutagens and carcinogens including nitrosamines, aflatoxins, polycyclic hydrocarbons, and other fossil fuel combustion products and including structure-activity correlations. The mechanisms for induction of mutations in mammalian cells in vivo are being studied, with several different selection and detection mechanisms used for recognizing the mutant cells. Work is also concerned with measures of human DNA damage and repair, and biomarkers of human exposure to mutagens.

10. Research in immunotoxicology is concerned with elucidating mechanisms that mediate chemically-induced immunotoxicity. Among studies are those investigating the role of inhibitors of arachidonic acid metabolism on humoral immune function, those examining alterations in lymphocyte proliferation and differentiation induced by various chemical classes including aromatic amines and polyhalogenated aromatic hydrocarbons, and those studying the association of asbestos exposure with systemic immune system stimulation.

11. Research continues on the effects and mechanisms of chemical toxicity in other target organ systems, including the cardiovascular, blood forming, dermal, and endocrine systems.

Toxicology Testing

The NIEHS does relatively little toxicology testing in its inhouse research and extramural research grants programs with two major exceptions. As human epidemiological studies are categorized for this exercise under Toxicology Testing, there is a large extramural and much smaller inhouse effort in epidemiological studies related to chemical exposure. The inhouse epidemiology program is located in the Division of Biometry and Risk Assessment (DBRA) and is supported primarily through research contracts and interagency agreements. The major laboratory commitments to toxicology testing are divided between intramural laboratory components of the NTP (the Division of Toxicology Research and Testing [DTRT]) and studies conducted under the collaborative research program. Included are testing for carcinogenicity, neurobehavioral toxicity, immunotoxicity, general and target organ toxicity, reproductive and developmental toxicity and teratogenicity, and genetic toxicity. The largest single efforts relate to short-term testing for genetic effects and prechronic and two-year animal studies for toxicologic and carcinogenic effects of chemicals.

Toxicology testing activities include:

1. Epidemiological studies in the inhouse program (DBRA) are primarily concerned with understanding the environmental etiologies of chronic disease. Particular emphases have been placed on determining what effects pollutant exposure have on reproduction and on postnatal development. In one study, women exposed to high levels of PCBs several years ago, and their offspring, are being monitored for a variety of toxic endpoints including genetic, neurologic and immune system effects. Field studies continue to address the role of environmental factors in the etiology of some less well studied chronic diseases with special emphasis on chronic renal disease, and more recently, evaluation of possible association of exposure to certain solvents with leukemia. A comprehensive laboratory program has been inaugurated to develop assays that will generate sensitive measures of the effects of environmental exposures on human populations. Initial efforts are on methods for detecting genetic damage and altered chemical metabolism in human body fluids and tissues with subsequent field testing of assays in an epidemiologic setting. A modified assay has been developed that greatly enhances the ability to detect genetic damage from smoking.

2. Epidemiological studies in the extramural program are generally of three types: (a) general population, e.g., effects of air pollutants in cities; (b) occupational populations, e.g., rubber workers, asbestos workers, etc., or, (c) special populations such as young children or groups with compromised health status. Ongoing epidemiologic studies include assessing the relationship of particulate and gaseous pollutant exposure to acute and chronic lung diseases with such agents as SO_2, NO_x, ozone, hydrocarbons, various occupationally hazardous substances such as bischloromethylether, fluorocarbon polymers, and fibers such as fiberglass and asbestos. Also being monitored are reproductive abnormalities in workers exposed to a number of chemicals, and blood lead levels in pregnant women and the association with intra-uterine growth retardation. Human laboratory studies are evaluating exposure to low levels of NO_2 with increased respiratory infections, and the effects of acidic "fog" on exercising normal and asthmatic volunteers. Other studies are concerned with the neurobehavioral effects of heavy metals in workers; the effects of halogenated hydrocarbons, e.g., PBBs and DBCP, on spermatogenesis; and the pulmonary, hepatic and neurotoxic effects in workers of herbicides and PBBs.

3. Laboratory animal testing, primarily prechronic and chronic (two-year) studies with some testing done in intramural laboratories but with most of the efforts performed under contract. All the testing protocols include one or more special studies aimed at providing a broad toxicologic characterization of chemicals for carcinogenicity as well as genetic, immunologic, neurobehavioral, pulmonary, fertility and

reproductive, and other effects. A group of five *in vitro* short-term cellular and genetic toxicology assays is incorporated in the prechronic phase of the testing process. For most of the chemicals entered into the testing process, chemical disposition studies are also included. During FY 1986, 19 two-year studies were completed. During FY 1987, 33 chemicals will be started in the prechronic phase and 12 in the chronic phase of the testing process. A wide variety of chemicals are being tested including selected members of certain chemical classes, especially chlorinated dibenzofurans, phthalates, and 1,3-butadiene and its close structural analogs. As part of the Superfund project, a mixture of 28 chemicals will be investigated for toxicity both *in vitro* and *in vivo*.

4. Testing was completed on 353 chemicals in FY 1985 for mutagenicity. This included 182 completed chemical tests for gene mutations in microbial (*Salmonella*) systems and 75 completed chemical tests in a mammalian cell system (L5178Y mouse lymphoma). Sixty-three chemicals were assayed for their ability to induce chromosome aberrations and sister chromatid exchange in Chinese hamster ovary (CHO) cells in culture. Further, 33 chemicals were tested for their ability to induce sex-linked recessive lethals and heritable translocations in *Drosophila melanogaster*. Chemicals tested were selected largely from those found positive in microbial and/or CHO cells.

Toxicology Methods Development

NIEHS supported research concentrates on the development and validation of sensitive, specific and rapid means for predicting, detecting and characterizing the toxicity of chemical agents in the environment. This research employs basic research findings on effects and mechanisms of toxicity as a basis for the rational development of new and improved test systems. These efforts can be divided into two general categories as follows: (a) developmental and applied research in laboratory animals and *in vitro* systems, as well as the development of analytical chemistry procedures; and, (b) research activities which seek to extend laboratory studies to human risk assessment.

A. Developmental and Applied Research

Major emphasis is placed on developing and validating short-term test systems which will identify, detect, characterize and quantify carcinogenic, mutagenic and teratogenic effects of chemicals and toxic effects of chemicals on target organs, particularly, the nervous, reproductive, pulmonary, digestive, renal, endocrine, and immune systems. Stress is placed on developing biochemical and physiologic markers for the early detection of chemically-induced diseases.

Research studies are conducted in the following areas:

1. In the area of cellular and genetic toxicology, emphasis was given to completing a three-year project evaluating four widely used *in vitro* assays of genetic toxicity for their ability to predict carcinogenicity of selected chemicals in rodents. Major conclusions were that: (1) one test (the *Salmonella* assay), when positive, predicted well for

positive *in vivo* carcinogenicity tests; however, when negative, had no predictive value; (2) the overall predictive performance of that one test for carcinogenicity is as good as any combination of the four assays; (3) the four assays alone will not replace long-term rodent studies, notably in predictivity for noncarcinogens; and (4) these assays continue to offer an economical, rapid and dependable means to detect genotoxic chemicals.

Other activities include development and/or validation of assays for aneuploidy induction in yeast, chemical induction of gene transposition in fruit flies (*Drosophila*), and a human hepatocyte cell assay. Two *in vivo* assays are being evaluated for their complementarity to the four *in vitro* assays in predicting potential carcinogenicity of chemicals. They are the mouse bone marrow cytogenetics assay and the erythrocyte/bone marrow micronucleus tests. A standardized protocol has been developed for cytogenetics of human lymphocytes and is being applied to select population groups. Efforts at measuring germinal mutations include the morphological specific locus assay and concurrent evaluation for cross-test comparison of two newer assays for heritable effects, the heritable translocation test and the biochemical specific locus assay.

2. In the area of carcinogenesis, a program to assess the utility of rat liver tumor assays for carcinogenic effects via initiation/promotion mechanisms continued. The mouse lung adenoma bioassay is being evaluated for utility in measuring tumor activity of pure compounds and mixtures from fossil final combustion. Utilizing its extensive capacity to study carcinogenicity in animal models, the NIEHS is investigating mechanisms of oncogene activation for possible use in risk analysis of chemical carcinogens.

3. In the area of reproductive and developmental toxicology, research seeks to develop better test systems for measuring or predicting infertility, teratogenesis, and genital tract abnormalities in neonatal animals. Studies include the development and validation of an *in vivo* reproductive toxicity assay, establishment of an inhalation reproductive toxicity capability, and continued validation of a short-term teratology screening method in *Drosophila*. Evaluation of a continuous breeding assay for fertility assessment was completed in FY 1986. Two cell culture systems continue to be evaluated as indicators of teratogenic potential.

4. In the area of neurobehavioral toxicology, methods are being developed to assess neurotoxicity in perinatal and immature animals. Neurochemical methods are being developed which are correlating changes in neuroendocrine and neuropeptide profiles and receptor binding with subtle toxic effects of chemicals. New cell culture techniques are being utilized to isolate specific CNS cells and study the effects of foreign chemicals on their function.

5. In research in pulmonary and inhalation toxicology, emphasis has been given to detecting and characterizing tissue and blood levels of lung specific enzymes and hormones which may be used as early markers of

pulmonary damage by chemicals. Two new noninvasive methods to detect pneumotoxicity induced by chemicals have been developed using the guinea pig as the experimental animal.

6. Specific and sensitive tests for chemical toxicity are also being developed in other target organs. A sensitive and reproducible core panel of immunology assays and infectivity models to assess chemically-induced immunotoxicity have been validated and are being used. Lymphocyte markers are being developed to evaluate exposure and "biologically effective dose" (DNA-adducts) of a chemical in animals and humans. In general, chemical response profiles are being used to develop test procedures that will permit identification of preclinical exposure to specific environmental substances in human populations. Efforts in renal toxicology are focused on development of culture techniques for kidney tubules and intact renal cells along with indicators of renal toxicity for testing of chemicals in vitro.

7. Research in analytical chemistry is focused on improving or developing instrumental and biochemical techniques for separating and measuring toxic chemicals and characterizing metabolites in biological samples, and samples of environmental media, e.g., water. Particular emphasis has been given to polyhalogenated aromatics. State of the art instrumentation is used to achieve high sensitivity and specificity in various analyses. Nuclear magnetic resonance spectroscopy is being evaluated as a non-invasive means to study chemical toxicity in live animals including studies of tumor progression or regression in rodents.

8. Considerable effort has been given to development of methods for synthesis of organic chemicals of environmental importance and their metabolites, especially halogenated aromatics and polycyclic hydrocarbons. Microencapsulation is being developed to facilitate use of volatile, unstable or unpalatable chemicals in feeding studies.

B. Research Activities Relating to Estimates of Risk in Humans

Research activities include:

Quantitative estimation of possible human health effects from exposure to environmental agents based on both epidemiological studies and laboratory studies using techniques such as high-to-low dose carcinogenesis extrapolation. Research reflects an awareness that biochemical approaches can contribute a great deal to risk assessment. Approaches aimed at reducing uncertainty in current methodology for extrapolations include quantifying measures of receptor interactions, DNA adducts, DNA repair, and activated oncogenes in accessible human samples as well as experimental animal models. For example, the methodology for low-dose extrapolation in carcinogenic risk assessment has been modified to include formation and repair rates for carcinogen-DNA adducts in specific cell types. The potential use of the amount and persistence of carcinogen-DNA adducts formed in target cells as a measure of effective dose of a carcinogen should help in the low dose and species-to-species extrapolation of carcinogenicity data. The experimental designs of the two-year toxicology and carcinogenesis studies have been modified to attempt to provide better low-dose data for extrapolation without adversely affecting the power of the test for detecting carcinogenic effects.

FOOD AND DRUG ADMINISTRATION*

Overview

The Food and Drug Administration (FDA) is the principal consumer health protection agency of the Federal government. It is responsible for ensuring that: (1) food is safe and wholesome; (2) biological products such as vaccines, human and veterinary drugs and medical devices are safe and effective; (3) cosmetics are safe; (4) use of radiological products does not result in unsafe or unnecessary exposure to radiation; and (5) all of these products are honestly and informatively labeled. FDA's research program, which is mission oriented, plays an essential role in enabling the Agency to meet its responsibilities for protecting the public health. Toxicology research, the subject of this report, is designed to provide data to strengthen the scientific base for assessing risk or safety and to improve understanding of basic biological and biochemical mechanisms of toxicity. Although the listing of FDA's toxicological research is characterized as method development or testing, programs actually cover a spectrum from basic research at the molecular level to toxicity assessment in the intact animal. The overriding objective of the toxicology research program is to improve the Agency's capability for assessing product safety or risk and to provide as solid a scientific base for making regulatory decisions as the state-of-the-science will support.

The FDA conducts or sponsors research in the following areas:

- Basic Toxicology - To determine the toxic effects of chemicals and establish the basic mechanisms by which these agents affect biological systems. This knowledge can lead to improved test systems for predicting toxicity and thus to the prevention of disease caused by toxic agents;

- Methods Development - To develop and validate sensitive and specific test systems and analytical methodologies for detecting and characterizing the toxicity of chemical or physical agents; and

- Risk Assessment - To focus on the elaboration of several critical assumptions in toxicology and carcinogenesis which, while commonly used, have not been adequately tested. Some assumptions are amenable to study in laboratory animals and include: (1) comparison of adverse health effects obtained from a daily dose of hazardous substances with variable, intermittent, and short-term dosing; (2) comparison of absorption by various routes of exposure; (3) determination of target tissue site dose; (4) comparison of relative carcinogenic potency across strains and species; (5) evaluation of effects of modulating factors such as diet and diverse states; and (6) determination of the adequacy of statistical techniques in adjusting tumor rates for differences in non-tumor mortality across strains or species.

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* A contributor to the National Toxicology Program

FDA chemical toxicology research is associated with drugs, cosmetics, food additives, nutrients, dietary supplements, and food contaminants. Scientific investigative and testing research include the following study types:

- Subchronic and chronic toxicology;
- Dermal and ocular toxicology;
- Developmental and reproductive toxicology;
- Immunotoxicology;
- Disposition, metabolism and pharmacokinetics of toxic substances;
- Genetic toxiciology and genetic repair mechanisms;
- Biochemical toxicology and biomarker research;
- Comparative toxicology;
- Risk science and interspecies scaling research; and
- Nutritional modulation of toxicity.

FDA also sponsors extramural research which supplements and extends scientific endeavors undertaken at the different FDA centers and at the National Center for Toxicological Research. Such intra- and extramural research activities are mission-oriented and relate to both scientific matters of regulatory concern and basic toxicology research.

All of FDA's scientific research activities must fall within the scope of the mission for the Agency and must be supportive of the FDA's Congressional mandate. FDA's commitment to the National Toxicology Program is, in large part, through the research conducted at the National Center for Toxicological Research (NCTR).

The NCTR is not directly involved in specific regulatory actions of the FDA and other government agencies, but serves to provide a broader scientific base of knowledge for the functions of the regulatory decision-making process.

The basic research mission of the NCTR uses a mechanistic, rather than a descriptive, approach to toxicology seeking answers to explain how chemicals produce cellular injury or induce toxic changes in cells. Such research includes, but is not restricted to: the role of DNA damage and repair in chemically-induced degenerative disease processes as a function of animal age and species and target organ susceptibility; understanding the synergistic interaction between physical particles and chemical carcinogens; the role of oncogenes in development and in the response to toxic insult; elucidation of the metabolic pathways leading to activation and detoxification of potential carcinogens; identification of the nature of chemical damage to cellular constitutents; and exploration of the biochemical pathways leading to the initiation and progression of neoplastic injury leading to impaired cellular functions, cell death, or to neoplasia, may result in the development of new techniques for prevention of disease at the subcellular level.

Some of the activities of NCTR are closely coordinated with the National Toxicology Program (NTP). Compounds of interest to the FDA and NTP are being evaluated for carcinogenesis at NCTR. In addition, NCTR's recognized capability in the research areas of genetic toxicology and reproductive and developmental toxicology is being contributed to the NTP. NCTR also has a close working and coordinative relationship with NTP with respect to providing the data processing capabilities at the contractor sites for the bioassay programs.

The combined efforts of the NCTR missions outlined above provide a data base for regulatory action and for extrapolation science research which utilizes data from basic research and from animal models for the evaluation of potential human health risks of chemical toxicants. Directing this effort is the overall goal to define and test the various assumptions and parameters involved in quantitative risk assessment.

Overview

The National Institute for Occupational Safety and Health (NIOSH) conducts toxicology research to identify chemicals that may pose hazards to workers. The Institute's toxicology program provides technical assistance to the Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA), both in the Department of Labor, and to State health departments. NIOSH also cooperates with other components within the Centers for Disease Control to perform toxicologic studies of public health significance.

Important findings from the Institute's toxicology studies result in three actions. First, information releases are prepared for public dissemination. The principal targets of these releases are workers or their representatives, manufacturers, and users of the chemical under study. Second, the results are used to stimulate industry-wide studies, which involve surveillance and epidemiologic investigation of worker groups. Third, the findings are provided to other government agencies for their use.

NIOSH is mandated under the Occupational Safety and Health Act of 1970 to conduct Health Hazard Evaluations (HHE's) of workplaces. HHE's are performed in response to requests received from workers, their representatives or their employers. Occasionally, HHE's reveal morbidity that cannot be explained with current toxicology information. In response, NIOSH designs toxicologic investigations to elucidate mechanisms of toxicity that may account for the HHE findings.

Toxicology at NIOSH is conducted by two Divisions: the Division of Respiratory Disease Studies (DRDS) in Morgantown, West Virginia, and the Division of Biomedical and Behavioral Science (DBBS) in Cincinnati, Ohio. The DRDS concentrates on hazards that cause respiratory ailments such as Coal Workers' Pneumoconiosis, byssinosis, asbestosis, emphysema, industrial bronchitis, and silicosis among coal and metal/non-metal miners, cotton processors, and agricultural workers. The DBBS conducts toxicologic research on problems found in general industry, including agents that pose neurologic, reproductive, carcinogenic, cardiopulmonary, or skin hazards to workers, and toxic interactions between substances that occur together in the workplace.

Basic Toxicology Research

The Institute's program for FY 1986 in basic toxicology consists of studies of: hydrocarbon chain length on neurotoxicity; mechanisms of cardiotoxicity of carbon disulfide, acrolein and allylamine; temporal factors in carcinogenicity; etiology of asphalt fumes carcinogenesis; and characterization of the metabolic pathway of bis(2-methoxyethyl) ether as it relates to testicular toxicity; determining absorption of N,N'-diethyl-m-toluamide (m-DET) from application to skin; evaluation of disease mechanisms by pathology; and culture of isolated heart cells for study of cardiotoxins.

Toxicologic Testing

The NIOSH program for testing toxic substances, using traditional methods and experimental designs, falls into the following categories:

- Reproductive Toxicology--Several studies will investigate the effects of various workplace chemicals on fertility and reproduction, with an emphasis on industrial solvents administered by inhalation exposure. Experimental animals of both sexes will be exposed, and effects on fertility and reproduction will be evaluated.
- Pulmonary Toxicology--Vanadium pentoxide will be evaluated as an asthmagen and various asbestos samples will be tested for their ability to produce mesotheliamas after intrapleural implantation.
- Neurobehavioral Toxicology--Human and animal laboratory studies will investigate the effects of workplace solvents on behavior and associated neurologic function. The animal studies include studies of effects on the development and maturation of animals exposed in utero.

Toxicology Methods Development

The underpinnings of any successful program in toxicology are the methods used for toxicity testing. During FY 1987, NIOSH will devote about 48% of its toxicology budget to developing new methods or enhancing existing methods for toxicologic screening of workplace substances. The following areas will comprise methods development activities in FY 1987:

- Mutagenesis--One project will address the development of mutagenesis assay systems using primary lung cells.
- Reproductive Toxicology-- Two projects will be concerned with developing improved methods for assessing reproductive hazards. One project will examine the potential use of *Drosophila* to predict teratogenicity in assay systems. The other project will examine improved methods and develop normal values for semen analysis.
- Neurobehavioral Toxicology--The development of methods appropriate for detecting neurobehavioral effects of workplace chemicals has been underway since FY 1984. In FY 1987, studies will be conducted to evaluate the WHO test battery and NES-computerized battery.
- Cocarcinogens--A contract effort will evaluate tissue culture methods as a screening technique in the assessment of workplace cocarcinogens. Another project will evaluate previously developed guidelines for informing workers of carcinogen hazards through health-risk messages.
- Immunologic/Pulmonary Toxicity - Development of short-term assays for substances toxic to the lung will be initiated.
- Biochemical/Cellular/Tissue Effects - Several projects will be involved with developing biological monitoring methods and methods of measuring

percutaneous absorption. Among the methods being developed are those for measuring macromolecular adducts of aryl amines, and urinary metabolites of pyrene, methyl ethyl ketone, glycol ethers, MBOCA, and the insect repellant, m-DET. Methodology using cultured epidermal cells to detect contact allergens will be established.

CENTERS FOR DISEASE CONTROL/CENTER FOR ENVIRONMENTAL HEALTH

Overview

The Centers for Disease Control/Center for Environmental Health (CEH) conducts toxicologic research to identify chemicals that may pose hazards to persons in non-occupational settings. The Center's toxicology program provides technical assistance to the U.S. Environmental Protection Agency (EPA), Agency for Toxic Substances and Disease Registry (ATSDR), and to State health departments. CEH also cooperates with other components within the Centers for Disease Control (such as the National Institute for Occupational Safety and Health) to perform toxicologic studies of public health significance.

Important findings from CEH toxicology/epidemiology studies may result in three actions:

> First, the findings are provided to other government agencies for their use in making risk management decisions or in the development for enforcement of regulations (e.g., EPA and ATSDR).
> Second, the results are used to stimulate more studies in the public health research community to cooperate and refine these etiologic studies.
> Third, information releases are prepared for public dissemination.

Under the Comprehensive Environmental Recovery, Compensation, and Liability Act (CERCLA or "Superfund"), the Agency for Toxic Substances and Disease Registry (ATSDR), CEH has responsibility to conduct studies of human exposure and health effects around toxic waste sites in the U.S. Many of these studies are carried out by CEH under a Memorandum of Understanding with ATSDR. These studies are performed in response to requests received from state health departments or EPA. Usually, these studies include an evaluation of effects on specific target organs or systems (based on the extant animal toxicologic and epidemiologic literature) using "off-the-shelf" *in vitro* and *in vivo* assays; however, CEH maintains an active and highly productive research laboratory which has been involved in the development of new, more sensitive and specific laboratory tests for use in these field investigations.

Toxicology at CEH is conducted by two Divisions: the Division of Environmental Hazards and Health Effects (EHHE) which is responsible for design, implementation, and analysis of exposure assessments and epidemiologic studies and the Division of Environmental Health Laboratory Sciences (EHLS) which is responsible for laboratory methods development, standardization, and interpretation. Other CEH Divisions with occasional involvement in human toxicology research include the Division of Chronic Disease Control (CD)--e.g., cancer cluster investigations and disease incidence mapping and the Division of Birth Defects and Developmental Disabilities (BD)--e.g., reproductive toxicology. All of this work is focused in toxicologic research on problems found in the general environment, including agents that may pose either acute or chronic neurologic, reproductive, carcinogenic, hepatic, or immunologic hazards to persons in residential or recreational settings.

Basic Toxicology Research

The CEH supports a diversified basic toxicology research program designed to develop a series of laboratory tests with greater sensitivity, selectivity, accuracy and precision to allow a more definitive assessment of the impact of environmental chemical hazards to public health. This environmental public health research program consists of two basic areas of study: (1) assessment or quantitation of exposure to toxicants, and (2) assessment of health consequences resulting from exposure. Effective exposure assessment necessitates the measurement of toxicants or their metabolites at the trace and ultra-trace levels in a variety of biological matrices, which requires innovative development and application of state-of-the-are technology. The research in assessment of health consequences combines proven, medically documented, routine laboratory tests to assess functional statuses of selected organs, with advanced technologies, and new methods specifically to seek subtle health change indicators of chemical injuries to these organs. A primary objective of these studies is the early detection and characterization of subclinical dysfunction of selected organs, permitting more effective and timely implementation of medical intervention.

Toxicologic Testing

Within the research area of toxicologic testing (which includes epidemiologic studies of selected population groups with defined or suspected exposure to environmental contaminants) CEH:

1. conducts epidemiologic research and investigations of human exposure to environmental hazards, including man-made and naturally occurring toxicants, and resultant and presumed health effects, including environmentally-related syndromes of unknown etiology;

2. provides epidemiologic emergency response to environmental disasters;

3. develops methods and conducts activities to assess risk to human populations from exposure to environmental hazards;

4. coordinates surveillance activities directed at characterizing human exposure to environmental hazards;

5. assists state and other Federal agencies in establishing and maintaining registries of persons exposed to toxic substances and persons with disease resulting from toxic exposures.

Past examples of such investigations include the Times Beach and Quail Run (Missouri) dioxin health studies, a study of arsenic exposures in children around a smelter (Anaconda, Montana), a study of contamination of U.S. amateur radio operators' equipment with PCBs, and the study of exposure to heptochlor-contaminated dairy products (Arkansas and Missouri). In FY 1987, studies in which CEH will be involved include the completion of the McKin (Maine) dumpsite health effects study; a study to characterize national human serum-PCB levels and another to characterize national human adipose tissue TCDD levels; a study to evaluate exposures to (and health effects from) PCBs in residential settings around Bloomington, Indiana; and a final analysis and report of exposure of persons in Memphis, Tennessee to pesticide residues in their residential environment.

Toxicology Methods Development

An important part of the foundation on which medical epidemiologic studies of potential human toxicity due to exposure to environmental contaminants is based is the development and use of sensitive and specific laboratory toxicologic tests. Accordingly, CEH has designed an increasing percentage of its FY 1987 research budget toward development of new methods for toxicity testing and for enhancing existing methods for toxicologic screening of environmental contaminants. For example, during FY 1987, EHHE will initiate new programs to develop, test, and use batteries of tests to evaluate immunotoxicologic and neurobehavioral toxic effects in exposed non-occupational populations. In addition, CEH will continue to coordinate proficiency testing programs for methods used in screening, diagnosis, treatment, and prevention of adverse health effects from environmental hazards (e.g., childhood lead poisoning).

Research efforts will continue in the development and validation of analytical methods for measuring PCDDs, PCBs and selected pesticides at the sub-parts-per-billion levels in biological specimens. Recent advances in the technology of medium graphite and vapor atomic absorption and other novel analytical techniques will be used to develop special methods for metals analysis and species characterization in biological specimens. Advanced technologies and new methods are being pursued to identify more selective indicators of renal and hepatic dysfunction.

NATIONAL EYE INSTITUTE

Clinical evidence indicates that many drugs and chemicals can damage the eye. Of particular concern are the adverse effects of drugs and poisons on the cornea, lens, aqueous outflow channels, retina, and optic nerve. The latter two structures are particularly vulnerable to toxic insult.

The development of sensitive, noninvasive tests of visual function, new animal models of human ocular toxicity, and new tissue culture techniques gives cause for optimism that ocular toxicology, which is presently in its infancy, will develop rapidly and mature over the next few years. At present, most of NEI's support for toxicology is in basic toxicology research. A few projects are concerned with developing methods for evaluating toxicologic effects in the functioning eye and in isolated ocular tissues.

The National Eye Institute has no toxicology testing program *per se*. Although studies of adverse drug reactions are included within broader studies of drug actions and preclinical and clinical trials of chemotherapeutic agents in which toxic effects are monitored are supported, no established test protocols are available; each principal investigator has adopted a system suited to his or her particular research goals and plan. The NEI does not support any studies of toxicology methods development.

Although the National Eye Institute's support of research on ocular toxicity is modest at present, this field has been identified in the 1983 Report of the National Advisory Eye Council, *Vision Research--A National Plan: 1983-1987*, as one of special importance. We expect that the highlighting of research priorities related to ocular toxicity in this report will stimulate interest among vision research scientists in submitting applications for research grants in this field.

NATIONAL HEART, LUNG, AND BLOOD INSTITUTE

Overview

The National Heart, Lung, and Blood Institute (NHLBI) provides leadership for a national program of research on the causes, treatment, and prevention of diseases of the heart, blood vessels, lungs, and blood, and on blood resources and the uses of blood and blood products. The Institute plans, fosters, and supports an integrated and coordinated program including investigations, clinical trials, and demonstrations and education programs relating to diseases in its purview through extramural contracts and research grants and in its own laboratories.

The research programs of the Institute are not focused primarily or directly on toxicology research. Relevant research includes the study of the safety and efficacy of drugs used in the treatment of cardiovascular, lung, and blood diseases and basic, applied and clinical studies of lung diseases caused by various environmental agents.

Basic Toxicology Research

The NHLBI supports studies of the effects of environmental pollutants, atmospheric gases, trace metals, and potential blood substitutes. The majority of these studies seek to establish, with biochemical, cellular, and animal models, the molecular mechanisms involved in the responses to such agents. Studies include determination of the effects of mutagenic substances derived from the environment, such as tobacco smoke constituents, on the metabolism in blood vessel walls and in myocardial cells, and on the induction of pulmonary fibrosis. Substances such as alkaloids, certain aliphatic amines, minoxidil, dexamethasone, alcohol, cardiotoxic anti-tumor drugs, anti-sickling compounds, and contrast materials are being investigated at the cellular and molecular level to determine long-term toxic effects. *In vitro* studies are being conducted to determine the effects of various gases including anesthetics on biochemical processes in pulmonary cells. Other studies involve the clinical problem of drug-induced lung injury by agents such as bleomycin. The effects of industrial pollutants such as silica, asbestos and cotton dust also are being investigated at the molecular level with the use of experimental animals.

Toxicology Testing

Numerous drugs and chemical substances are tested for pharmacological effects. Potential toxicity secondary to therapy is a major concern in this area as well as toxicity of inhaled substances. Specific examples include: the development and testing of synthetic oxygen-binding iron chelates as well as those derived from hemoglobin; the development of drugs for the safe, effective treatment of sickle cell anemiae; an investigation of whether exposure of the normal and injured lung to sublathal oxygen concentrations causes physiological damage; a determination of whether steroids are effective in improving lung function; a study of vasoactive heme-reactive compounds including cyanide; and investigation of the modulation of cardiac function by cardiac glycosides.

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

The NIAID continues to be represented as an observer to the Committee to Coordinate Environmental and Related Programs (CCERP) and to be active in the Committee's activities.

It is expected that toxicology related research (basic and testing), sponsored by NIAID in FY 1987, will include grant, contract, and interagency-supported research.

In basic toxicology, the Development and Applications Branch (DAB), Microbiology and Infectious Diseases Program, will support one grant on biologically active fluorophosphonate derivatives.

In the area of toxicology testing, the DAB will support research, through ten contracts, to evaluate drugs for both efficacy and toxicity in animal models of viral diseases, to evaluate antivirals for the treatment of cytomegalovirus (CMV) infection in AIDS and other immunosuppressed patients, and to evaluate antivirals for the treatment of herpes infections. The Acquired Immunodeficiency Syndrome Programs will support three contracts and one interagency agreement to test antiviral agents in animal models infected with retroviruses.

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) has as its research scope the prevention, diagnosis, and better medical management of a wide range of disorders, most of a chronic nature. The wide variety of disorders falling within the purview of NIDDK includes: diabetes, cystic fibrosis and other metabolic and endocrine disorders; digestive diseases such as peptic ulcers, cirrhosis and pancreatitis; nutrition and its relationship both to disease and well-being; diseases of the kidney and urinary tract, such as glomerulonephritis and urolithiasis; and diseases of the blood.

Toxicology research is supported by the Institute as one means of enhancing the understanding of the etiologic and pathogenetic processes in these diseases, as well as improving methods of treating them.

Analysis of NIDDK's FY 1986 portfolio of research related to toxicology shows few examples of formal protocols for testing the toxic effects of substances. There are, however, several projects ongoing that involve the assessment of the toxicity of certain compounds, as well as the adverse effects of drugs on such organs and tissues as the liver, kidneys, bone marrow, and the neuroendocrine control system in man and animals. In basic toxicology research, Institute activity centers on elucidating the mechanisms involved in enzyme detoxification systems and on understanding how substances foreign to the body influence the metabolic balance of its various organ systems. At present NIDDK does not support research in toxicology methods development.

NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND SKIN DISEASES

The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) has as its research scope the prevention, diagnosis, and better medical management of a range of disorders relating to arthritis and diseases of connective tissue, musculoskeletal diseases, and skin diseases such as psoriasis and epidermolysis bullosa. Toxicology research is supported by the Institute as one means of enhancing the understanding of the etiological and pathogenetic processes in these diseases and of improving methods of treating them.

Analysis of the FY 1986 NIAMS portfolio of research related to toxicology shows few examples of formal protocols for testing the toxic effects of substances, although there are several projects involving the assessment of the toxicity of certain compounds, as well as the adverse effects of drugs on such sites as the skin and bone tissue. The Institute's support of basic toxicology research is limited at this time and, at present, the NIAMS does not support research in toxicology methods development.

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

Overview

NICHD supports a wide range of studies involving toxic substances in both intramural and extramural programs. The majority of them are within the category of basic toxicology research with a lesser effort in the testing or methods development areas.

Extramural Programs

Center for Population Research (CPR)

Research sponsored in the Reproductive Sciences Branch (RS) studies: new or more effective means of fertility regulation for use by men and women; funds efforts to understand and ameliorate human infertility; and in the area of reproductive chemistry encourages research for the isolation, purification, determination of structure and synthesis of compounds involved in reproduction. In two other branches a variety of projects for the development and evaluation of contraceptive agents are supported through contracts.

Center for Research for Mothers and Children (CRMC)

In the five branches of CRMC, there is a continuous interest in research that seeks to understand the effects of toxic substances on the processes of growth, maturation and adaptation in developing organisms from prenatal stages to young adulthood. Concern extends to women prior to and during pregnancy, and to the biological and behavioral manifestations that may result from contact with drugs, environmental agents and potentially noxious substances. Ongoing research examines the toxic effects of pollutants, drugs, and substances frequently used and abused such as caffeine, alcohol and tobacco. Clinical research includes studies on: the neurophysiologic and psychologic consequences of exposure to lead; effects of various components of cigarette smoke on the pregnant woman and her fetus; antibiotics in the treatment of prenatal, perinatal and postnatal infections; and the use of therapeutic agents in the treatment of childhood diseases and disorders including behavioral and psychomotor problems. Animal studies attempt to elucidate mechanisms of abnormal biological or behavioral development and of differential sensitivity to drugs, and the induction of cytogenetic abnormalities by chemical agents. In the CRMC, support is provided through grants, program projects and center grants.

Intramural Program

Laboratory of Developmental Pharmacology

Work in this Laboratory centers on the properties of inducible drug metabolizing enzymes. The goal is to understand the genetics of these systems in order to elaborate their role in mutagenesis, teratogenesis, carcinogenesis, and drug toxicity. Currently investigations are directed toward a study of at least nine gene families controlled by the interaction of various drugs with their receptors. These genes, coding for the P-450 drug metabolizing proteins, have been studied, their gene products isolated, and antibodies to these gene products have been raised. The genes have been sequenced and the flanking regions identified and also sequenced. An understanding of these genes and the manner in which they are controlled will undoubtedly lead to fundamental knowledge about drug metabolism and toxicity. The interactions of the metabolic pathways controlled by these genes are fundamental to an understanding of the clinical use of these drugs.

Another class of drug metabolizing enzymes, the UDP-glucuronosyl-transferases, is being studied in a similar way. These enzymes, which serve to render fat soluble materials water soluble and excretable, form a major pathway of drug detoxification in the body. Several of these enzymes have now been purified and antibodies raised against them. The cDNAs for some of these systems have been obtained and work is progressing toward a molecular understanding of this important gene system. The conjunction of bilirubin is carried out by one or more of these transferases, so that a better understanding of hyperbilirubinemia of the newborn and genetic disorders occurring after the newborn period should be helpful in these areas of clinical medicine.

Human Genetics Branch

A portion of the work in this Branch involves applied studies on alcohol toxicity and basic studies on the mechanism of alcohol sensitivity. Previous work has shown that acute administration of alcohol to pregnant monkeys causes drastic changes in fetal-maternal circulation, with consequent limitation of the blood flow and oxygen supply to the fetus.

Studies of a more basic nature deal with the molecular basis of sensitivity to alcohol and the Fetal Alcohol Syndrome. Inspection of the enzyme transketolase, and especially of its affinity for its cofactor, thiamine, have provided a rational basis for considering the thiamine deficiency found in various alcoholic conditions. Preliminary evidence indicates that some alcoholic men and their sons may have a genetic predisposition to thiamine deficiency in the presence of co-existing alcoholism. These findings might relate to some of the complications of alcoholism and to such conditions as the Fetal Alcohol Syndrome.

NATIONAL INSTITUTE OF DENTAL RESEARCH

As the primary sponsor of dental research in the United States, the National Institute of Dental Research (NIDR) maintains responsibility for improving oral health through increased knowledge of oral and dental diseases and disorders. Components of toxicology research, testing, and method development occur in isolated projects supported by the Institute. For example, testing for toxic effects is conducted when screening anti-caries and anti-plaque agents, sugar substitutes, and chemotherapeutic agents used in treating oral herpes; determining the influence of trace elements on tooth structure; or testing the biocompatibility of dental restorative materials. In the area of craniofacial anomalies, the NIDR is exploring the role of environmental agents and genetic factors in oral-facial malformations. Studies are underway to define the molecular basis for genetic predisposition to certain teratogens.

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

The budget of the National Institute of General Medical Sciences (NIGMS) is devoted almost exclusively to the extramural support of research and research training at universities, medical schools, and similar institutions throughout the country. The NIGMS programs undergird the research areas of the other institutes.

Since the major part of this research is basic and undifferentiated, priority is based on opportunities for major advances in knowledge in a given program area and on the probability that new findings will ultimately contribute to the prevention, diagnosis, or treatment of disease.

Two of the programs in NIGMS which support research that relates to toxicology are the Pharmacological Sciences Program, and the Genetics Program. The NIGMS does not support toxicology testing programs, nor can any of the projects properly be described as toxicology methods development.

Pharmacological Sciences

The research efforts that NIGMS supports in the field of toxicology are characterized by two features, which are that they concern the toxicology of therapeutic drugs and their metabolites, and they are investigator-initiated. Thus, the research is directed toward a wide range of compounds and metabolites which have therapeutic as well as toxic effects on biological systems. The latter group includes a number of venoms, the toxicities of which are poorly understood.

Genetics

The Genetics Program supports research in the areas of DNA repair mechanisms and mutagenesis, which are included under the definition of basic toxicology research. Although most of this research is directed toward gaining an understanding of these processes in normal cells, some investigators also are studying mutant cells and cells from patients with a variety of disorders as a means of understanding the normal and disease processes. For example, some NIGMS grants support investigations on DNA repair in human cells from patients with xeroderma pigmentosum, Fanconi's anemia, Bloom's syndrome, and/or ataxia telangiectasia.

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE

Overview

Toxicology research involving environmental chemicals is not one of the main thrusts of NINCDS research efforts. However, areas of neurotoxicology, such as drug-induced adverse reactions, use of toxic chemicals in understanding physiological mechanisms of the nervous system, localization and disposition of substances involved in neurotoxicity and some other related aspects of neurotoxicology, are of prime interest to the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS).

The following is a brief description of activities by subject categories:

Basic Toxicology Research

Studies continue to be supported on the neurotoxic effects of heavy metals, artificial food colors, synthetic estrogens, kainic acid and some drugs. Particular attention is being given to MPTP, which has proven useful in development of an animal model of Parkinson's disease. The objective of some of these ongoing studies is to develop appropriate animal models that will provide information on the basic mechanisms of neurological diseases and their potential therapy. Some current research is devoted to synthesis of neurologically active agents, characterization of biologically active peptides in venoms, mode of action of neurotoxicants, analysis of the effects of neurotoxic chemicals on the nervous system, pathogenesis of peripheral neuropathies and modulation of the toxicity by endogenous substances. Some of the studies focus on the localization and disposition of neuroactive elements. Studies are also supported at electron microscopic and cellular levels using high resolution techniques to develop sensitive cytochemical and histochemical information. Some intramural research concerns understanding the suspected brain damaging or teratogenic effects of some lipophilic acids, and their effects are compared with others that are used as food additives, antiseptics and drugs.

Toxicology Testing

NINCDS does not have a toxicology testing program, as such, aimed at routine testing of chemicals in biological systems using standard test protocols. However, the Epilepsy Branch of the Convulsive, Developmental and Neuromuscular Disorders Program conducts limited toxicology testing of potential anticonvulsant drugs. A number of other studies are focused toward elucidating the underlying mechanisms of toxicity induced by suspected toxic or neurological teratogenic substances. In addition, neuropharmacological studies are directed towards defining neurotoxic side effects of novel therapeutic drugs.

Toxicology Methods Development

NINCDS supports a number of studies which are related to the development of appropriate animal models that are expected to provide information on basic mechanisms of neurological diseases. In this process, animals are exposed to compounds which are believed to produce neurotoxic sequelae resembling certain diseases; the associated biochemical or pathological parameters are monitored.

NATIONAL INSTITUTE ON AGING

The National Institute on Aging does not have programs which as their primary purpose are intended to support studies of toxicology. However, there are elements in its overall program that involve aspects of toxicology; these are principally in basic research. Examples include the aging process, and differential effects of drugs and other chemicals on young adult and aged experimental animals.

NATIONAL LIBRARY OF MEDICINE

The National Library of Medicine (NLM) does not conduct studies in basic toxicology research, testing, or methods development. However, NLM contributes to the Annual Plan of the National Toxicology Program because many of the activities of the NLM's Toxicology Information Program (TIP) provide an information base in support of research, testing, and methods development related to toxicology.

Established in 1967, TIP is a direct outgrowth of the recommendations made by a panel of the President's Science Advisory Committee in 1966 which found that "there exists an urgent need for a much more coordinated and more complete computer-based file of toxicological information than any currently available and further, that access to this file be more generally available to all those legitimately needing such information." The TIP was created to meet these needs.

Over time, TIP has concentrated on providing three types of services: publications, query response, and online retrieval. TIP's early efforts were directed to publications and query response while it investigated the rapidly changing computer and telecommunication technologies as means of designing automated toxicology information systems. Ultimately, interactive online retrieval services were to play - as they still do - the major role in TIP's activities. Following NLM's pioneering lead in developing MEDLINE, the earliest significant online bibliographic retrieval system, the TIP in 1972 launched TOXLINE, the first online retrieval service for the toxicology literature. The same year saw the development of CHEMLINE, an online chemical dictionary that facilitated the searching of TOXLINE and other information sources.

In the late 1970's, TIP made publicly available two data retrieval services, TDB (Toxicology Data Bank) and RTECS (Registry of the Toxic Effects of Chemical Substances). TDB is built and maintained by the TIP. RTECS is produced by the National Institute for Occupational Safety and Health as a publication and is maintained as an online service on the NLM MEDLARS network. The most recent of TIP's online services are DIRLINE (Directory of Information Resources Online), HSDB (Hazardous Substances Data Bank), which supplants the TDB, and CCRIS (Chemical Carcinogenesis Research Information System). Other recent TIP developments have been the creation of TOXNET (Toxicology Data Network), an integrated software system which facilitates the online building, editing, peer-reviewing and searching of factual databases, and of micro-CSIN, a software package for personal computers which assists in the rapid retrieval of information from a variety of disparate online systems.

Throughout its history, the TIP has maintained a linkage to the toxicology community through TIPCOM (Toxicology Information Program Committee), an advisory committee, which has been operated for the Library by the National Academy of Sciences (NAS). Through the years, TIPCOM has been staffed by some of the leading toxicologists in the United States. Many of these scientists have also been active in the Society of Toxicology and other professional groups, and, thus, have been able to keep close track of the information needs of toxicology and related fields.

In 1985, as part of its long range planning effort with TIP, TIPCOM recommended that NLM investigate the adequacy of information handling in the burgeoning field of biotechnology. In response to this recommendation, NLM supported, on May 5-6, 1986, a National Academy of Sciences Workshop on Biotechnology Nomenclature and Information Organization. The Workshop found that areas requiring attention are nomenclature, linkage among data banks, and strategies for capturing information and data from the biotechnology literature for subsequent search and retrieval.

ONLINE SERVICES

As stated, TIP is responsible for several of NLM's online services that relate to the provision of chemical and toxicological information. These services include the CHEMLINE, TOXLINE, RTECS and DIRLINE files on the ELHILL system and the CCRIS and HSDB files on the TOXNET system.

1. Databases under ELHILL

CHEMLINE (Chemical Dictionary Online) is an online chemical dictionary and directory file which allows users to verify chemical nomenclature and structure, and to formulate optimum search strategies for other NLM files. Each chemical record also has pointers to these other files which contain information about that chemical substance. CHEMLINE is built and maintained in collaboration with Chemical Abstracts Service (CAS). It is updated biomonthly and regenerated annually, and now contains over 700,000 records.

During FY 1986, several changes were made to increase CHEMLINE's effectiveness in retrieving records sought by users, and pointing to resources which might contain data of interest to them. The content of the Synonym field was enhanced further with the identifier [NLM] which indicates the synonym was provided by NLM. Citations in TOXLINE appearing during a 12-month period in 1985-86 were checked for new chemical names not appearing in CHEMLINE, and many such names were added to CHEMLINE after a quality review. Work is scheduled to obtain Hazardous Waste/Regulatory identifiers (synonyms), and to investigate the availability of commercial mixture names, and the names of foreign drugs.

A new Classification Code (CC) field was added to CHEMLINE. The first data put into this field was the Pharmacologic and/or Therapeutic Category data obtained from the publication USAN and the USP Dictionary of Drug Names. Thus all major "antiviral" drugs will be labelled as such, and will be searchable as a class. These data were added to over 2,700 drug records. To enhance the ability to use the directory function of CHEMLINE, certain file names were added, for the first time, to the Locator field; they were MED83, CANCERLIT, and CANCERPROJ on the ELHILL system, and HSDB and CCRIS on the TOXNET system. This allows users to bridge the gap between the two systems for chemical retrieval questions. Ring data for over 21,000 records was coded for addition to CHEMLINE.

TOXLINE (Toxicology Information Online) is an online bibliographic retrieval service, produced by merging "toxicology subsets" from some thirteen other secondary sources, including Biological Abstracts, Chemical Abstracts, Government Reports Announcement and Index (report literature), International Pharmaceutical Abstracts and Index Medicus. TOXLINE and its two backfiles TOXBAK76 and TOXBAK65 now contain some 2,018,000 records.

A new subfile from the Environmental Mutagen Information Center, the Aneuploidy File, was added to TOXLINE in 1986. It provides citations to the literature about various aspects of chromosomal abnormalities.

The enrichment of TOXLINE, following a change in the contract with BIOSIS through which NLM obtains material from Biological Abstracts, continues with input from this source tripling to about 37,000 records per year and increased coverage in the areas of occupational exposure to chemicals, disposal methods, and environmental effects of chemical waste dumps.

An evaluation of TOXLINE's coverage and how well this coverage adapts to changes in the field of toxicology and related sciences is being conducted in FY 1987. A contract has been awarded to the Institute for Scientific Information to undertake this evaluation using bibliometric analyses.

RTECS (Registry of Toxic Effects of Chemical Substances). an online data retrieval service is based upon a database which NLM obtains from the National Institute for Occupational Safety and Health and structures for online searching. In 1986, the file was enriched by adding Chemical Abstracts Service (CAS) Registry Numbers to RTECS records which did not have them. These identification numbers are crucial for unequivocal data retrieval and for matching RTECS records with those in other files. Some 12,000 records were enhanced in this way; a few thousand more remain to be processed. The work was done by CAS under contract. Funding support came from Superfund (see below). RTECS now contains over 80,000 records. Plans are underway to move this database to the TOXNET system.

DIRLINE (Directory of Information Resources Online), an online directory which refers MEDLARS users to organizations and other sources that can provide information in specific subject areas, has been available as one of NLM's online services since August 1984.

At present, DIRLINE uses data from (1) the Library of Congress' National Referral Center (NRC) database (14,405 records); (2) DHHS' Office of Disease Prevention and Health Promotion Health Information Center database (HR) (984 records); (3) the publication EMERGENCY MEDICINE and the American Association of Poison Control Centers' directories Poison Control Centers (PCC) (119 records); and (4) the DHHS Alcohol, Drug Abuse and Mental Health Administration Drug Abuse Communications Network (DRACON) (49 records).

II. TOXNET and its FILES

TIP's major file building and enrichment efforts this year continue to receive partial support from Superfund. The Superfund Act (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) charged the DHHS with health-related responsibilities vis-a-vis the cleanup of chemical dump sites and responses to accidents involving hazardous chemicals. The lead agency in the Department, for Superfund-related activities, is the Agency for Toxic Substances and Disease Registry (ATSDR). Relevant information activities, such as file building and creation of improved access methods to information resources, are carried out by NLM under an agreement with ATSDR. The predominant TIP acticity supported by Superfund has been enhancement of its data retrieval service, HSDB, which involved among others, the development of TOXNET, a new file building and online search system.

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In addition to the NLM TOXNET files described below, the CCRIS (Chemical Carcinogenesis Research Information System) file of the National Cancer Institute was mounted in TOXNET in February 1986. CCRIS is a scientifically evaluated and fully referenced data bank, developed and maintained by the National Cancer Institute (NCI), containing carcinogenicity, tumor promotion, and mutagenicity test results. Data are derived from the scanning of primary journals, current awareness tools, and a special core set of sources, including a wide range of NCI reports. Test results have been reviewed by experts in carcinogenesis. CCRIS is organized by chemical and now contains 1200 such chemical records. Toward the end of the year, RTECS will be moved from ELHILL to join the other TOXNET data files. TOXNET will eventually contain a cluster of toxicology data banks and will accomodate cross-file searching. A series of articles in the NLM Technical Bulletin have explained the operation of the TOXNET system and how to search its files.

TDB (Toxicology Data Bank) was the original online interactive data retrieval service, developed by NLM, focusing upon the toxicological properties of selected chemical substances. This file was moved into TOXNET as an expanded version of the discontinued ELHILL/TDB and has, itself, been used as a starting point to develop the even more extensive HSDB file (see below). The decision was made to discontinue TDB service on September 30, 1986, since all of TDB's data has been subsumed by the larger, more comprehensive HSDB.

HSDB (Hazardous Substances Data Bank) is another online data retrieval file. At this time, it contains records for 4,200 chemical substances described in 144 data elements. The scope of HSDB includes and expands upon that of the TDB by providing fuller information primarily in the areas of environmental fate and exposure, standards and regulations, monitoring and analysis, and safety and handling. Data are extracted from monographic and journal sources as well as from various Government documents and material safety data sheets.

Changes in the scope and coverage of the TDB, made it necessary to restructure the 10-year old procedure that had been used to provide peer review for the file content of such data banks. A new Scientific Review Panel, appointed by NLM but operated by a contractor, has been put in place. It is being co-funded by the Department of Defense (DOD) and reviews HSDB content as well as some material produced by the DOD-sponsored Hazardous Material Technical Center.

User Support for the online files is an ongoing TIP function. User Guides for the CHEMLINE, TOXLINE, RTECS and DIRLINE files were updated. A TOXNET User Guide and a preliminary guide for searching TOXNET were developed. A self-instructional guide was developed for DIRLINE. All the existing Fact Sheets were updated. Fact Sheets for the TOXNET software and each of the files on TOXNET were developed. TIP continued to provide training for its online files both as a part of the MEDLARS Training Program and for end-users at professional meetings and at other selected sites in the field.

INFORMATION SERVICES TO OTHER AGENCIES

The TIP continues to provide information services to Federal and State agencies, as well as to users in the private sector. TIP has also been involved in joint ventures with several Federal organizations in developing new or

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enhancing existing data and information services. The Program continues to be involved with the restructured Committee to Coordinate Environmental, Health and Related Programs (CCEHRP) and chairs the Subcommittee on Information Coordination.

Collaboration has continued with the Agency for Toxic Substances and Disease Registry (ATSDR), which is the organization coordinating CERCLA-supported activities across DHHS. These activities include the development of a prototype expert system, capable of running in a microcomputer, which supports information gathering for personnel responding to chemical emergencies.

Since 1983, TIP, in collaboration with the Lister Hill Center (NLM's research division), has developed a microcomputer-based workstation for chemical emergency response personnel. This permits rapid access to chemical, toxicological and hazardous waste information files located in various Government and private sector files. The ATSDR participated actively in the design, development and testing of the workstation which uses the micro-CSIN software and runs on an IBM-PC/XT or AT personal computer. TIP is now working with ATSDR to identify and develop new features to be added to the workstation, such as access to more factual databases, electronic mail, and improved scripts for searching bibliographic databases.

TOX-TIPS (Toxicology Testing-in-Progress) continued as a monthly publication identifying toxicology testing that is ongoing or planned in public or private sector laboratories. It also identifies from the open scientific literature new toxicological test methods as well as articles dealing with "alternatives to animal testing."

DIVISION OF RESEARCH RESOURCES

Overview

The Division of Research Resources (DRR) strengthens and enhances the research environment of institutions engaged in biomedical research by developing and supporting a variety of essential research resources. Assurance of optimal utilization of the resource is the responsibility of the institution receiving the grant. The nature of the research must be consonant with the aims of the resource.

Because of the multidisciplinary nature of the Division's programs, they have a major impact on all research supported in the Public Health Service. The Division's support of toxicology related research is a striking example of this in that it reflects DHHS toxicology support even though DRR has no program directed toward this objective. The largest concentration of DRR support of toxicology related research is in basic research, with lesser amounts in methods development and testing.

Basic Toxicology Research

The Animal Resources Program provides biomedical researchers with high quality, disease free animals and specialized animal facilities. Researchers are investigating teratogenic and mutagenic effects of toxic chemicals, infertility due to toxin exposure, and developmental abnormalities related to toxin and drug exposure in utero.

The Biomedical Research Technology Program develops and supports innovative technologies for biomedical research. These technologies, such as high-field multinuclear spectrometry, high-resolution mass spectrometry and laser microbeam instruments, have an important impact on toxicology research. Researchers apply these technologies and instruments to investigations of the structure, conformation and dynamics of toxic chemicals.

The General Clinical Research Centers (GCRC) Program supports specialized centers for clinical research. Researchers at the GCRCs conduct studies to evaluate the safety and efficacy of drugs used in the treatment of disease. Research is done to determine the biologic effects of drugs on organ systems as well as the disease. Other researchers at the GCRCs are evaluating patients exposed to environmental and food toxins such as lead, alcohol, food additives, and cigarette smoke.

The Biomedical Research Support Program supports biomedical research through two mechanisms, the Biomedical Research Support Grant (BRSG) and the Shared Instrumentation Grant (SIG). The BRSG awards are calculated as a percentage of an institution's total NIH support. Therefore, toxicology research supported through this grant mechanism reflects the broad range of toxicology research supported by the NIH. The SIG provides sophisticated instruments, such as NMR, MS, and transmission electron microscopes, on a shared basis to NIH-supported investigators. Researchers use these instruments for toxicology studies including: metabolic transformation of toxic compounds, action of heavy metals as cocarcinogens, cellular uptake and transport of toxins, and binding of toxic substances to nucleic acids.

The MBRS Program supports the development of minority faculty, students and institutions in biomedical research. Investigators supported by the Program are conducting biochemical analyses of toxic chemicals, such as pesticides, heavy metals and drugs of abuse.

Toxicology Testing*

Animal studies are designed to determine the toxic effects of chemicals on target organs and body systems and to characterize their carcinogenic, mutagenic and teratogenic potential. Behavioral anomalies in neonatal primates which result from previous exposure are being investigated. Studies of the structure and conformation of toxic chemicals result in more differentiated screening techniques. In vivo and in vitro assessment of chemical toxicity receives significant emphasis. Clinical drug trials are being used to assess efficacy and safety of new drugs and those previously considered nontoxic. Clinical trials compare several modes of therapy to determine those which have the most benefit and least toxic effect. Analyses of body fluids for trace metals and other chemicals are being researched as possible detection screens.

Toxicology Methods Development*

Researchers are trying to develop new or better plant/animal model systems for extrapolation of research to humans. Tehcniques are being developed for separating and measuring toxic biological samples. In vivo and in vitro assays are being developed to detect selected toxic chemicals and determine the mode of action which results in disease and/or adversely affects health status. Statistical models are being developed for air pollutants.

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*Tabular information on toxicology testing and toxicology methods development supported by the Division of Research Resources was not available in time for inclusion in the Review. For specific information on DRR activities, an agency contact with telephone number is given in the back of the Appendix.

DIVISION OF RESEARCH SERVICES

The Division of Research Services is charged with the primary responsibility of providing scientific and technical support services to the NIH intramural community. These include the provision of veterinary resources, library services, biomedical engineering and instrumentation, and medical arts and photography services. Our mission does not directly relate to toxicology research; however, we have technical support capabilities that might serve the NTP.

The support provided by our Biomedical Engineering and Instrumentation Branch in the field of pharmacokinetics has been an actively used service by many investigators conducting toxicology research.

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

Overview

The Alcohol, Drug Abuse, and Mental Health Administration does not administer a formal program of toxicology research. In the areas of mental health and drug abuse, several projects will be initiated or continued which specifically address toxicity of chemical agents whose therapeutic efficacy is being tested. Projects not specifically addressing toxicology issues are not included in this summary since they comprise a considerable portion of the agency's research effort, and to include them would be misleading.

The bulk of the agency's toxicology studies are in the alcoholism area, focusing on the action of alcohol on mental and physical processes. A more complete discussion of this work is included below.

National Institute on Alcohol Abuse and Alcoholism

The alcohol research grants program of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) is devoted to increasing knowledge and understanding of the causes, nature, and methods for prevention of alcohol abuse and alcoholism, and to develop new or improved methods for the treatment and rehabilitation of affected persons. Research supported by the Institute ranges from fundamental studies on the mechanisms of action of alcohol on mental and physical processes to applied research and developmental activities. Research projects sponsored by NIAAA involve the participation of scientists representing all of the behavioral and life-science disciplines relevant to the problems of alcohol abuse and alcoholism. The NIAAA supports a wide range of projects, many of which are directly related to toxicology. Projects in this area are all basic research focused on the understanding of the effects and fate of alcohol in biological systems, including modifying factors.

The effects of chronic alcohol use on liver leading to hepatitis and cirrhosis are well documented. Research is ongoing to investigate pathogenic effects of alcohol on the liver and gastrointestinal systems, and the treatment of liver disease and hepatitis. These projects include studies on the impaired immune response, membrane alterations, pharmacokinetics, fibrogenesis, gastric injuries, and impaired gastrointestinal functioning seen in alcoholics, as well as biochemical, physiological, and pathologic studies of liver damage. In addition, the research activities of one of the alcohol research centers are totally dedicated to the study of these pathologies, and several other centers have related component projects. Several RSDA recipients are also doing research in this area.

The toxic effects of both acute and chronic ethanol on the central nervous system (CNS) are also well known. NIAAA-supported projects are investigating a wide range of problems in this area, including the following: neurological and neuropathological sequelae of chronic alcoholism, biochemical and physiological changes in the CNS following acute and chronic ethanol administration. and the acute "neurobehavioral" effects of alcohol on learning and memory, cognitive functioning and performance on a psychomotor task (e.g., driving). The final major area of NIAAA-supported research grants related to toxicology is that of the Fetal Alcohol Syndrome (FAS). Research support is given both for epidemiological and descriptive studies in humans as well as for more basic studies utilizing animal models of the syndrome.

In addition to these major research efforts, the toxicological effect of alcohol on other organs and systems is being studied by NIAAA grantees. These other systems include the cardiovascular system, muscle, intestine, nutrition, salt, and water homeostasis systems, and endocrine systems, particularly the hypothalamic-pituitary-gonadal axis. Most of these effects have been well-documented in chronic alcoholics, and much of this research is directed at investigating mechanisms of action.

The NIAAA Intramural Research Program (IRP) generates knowledge on the acute and chronic effects of alcohol on various organs and on the pathologic or behavioral consequences of alcohol abuse. Included within its research protocols are studies: to elucidate the toxic consequences of acetate metabolism on the major metabolic pathways; to evaluate alcohol's toxic effects on brain functioning, particularly regarding alcoholic dementia and Korsakoff's syndrome; to determine the effects of alcohol on the immune system; and to evaluate factors leading to alcohol-induced degeneration of nervous system cells.

National Institute on Drug Abuse

The goal of the National Institute on Drug Abuse (NIDA) in the area of toxicology is to develop a knowledge base on the toxicological aspects of abused substances or of drugs which are proposed for use in the treatment of narcotic addiction. At present, NIDA is funding a 3-4 year contract which is aimed at studying the long term (1 year) consequences of cannabinoid (marijuana smoke and/or THC) exposure in monkeys. We will be examining potential neuroanatomical toxicity at the light and electron microscopic levels and trying to establish neurochemical and functional behavioral correlates by the use of sophisticated behavioral tests; e.g., time discrimination, conditioned position response, and the ability to learn. The contractor has recently finished pharmacokinetic studies of tetrahydrocannabinol and set up the behavioral apparatus to conduct the functional tests during THC administration and upon completion of the exposure period. He will soon initiate studies of two levels of marijuana smoke exposure. Upon completion of this phase, the next component will be started in which monkeys will be administered two doses of cannabinol (THC) by the i.v. route. Doses of plasma THC will approximate that attained during marijuana smoke exposure. If adverse effects are observed, possible reversibility of these effects will be examined upon termination of cannabinoid administration.

National Institute of Mental Health

The National Institute of Mental Health supports research related to the toxic effects of psychoactive drugs in both preclinical and clinical trials. Epidemiological studies and clinical trials to determine both safety and efficacy of drugs used for long periods of time are priority areas. Specifically, studies of lithium and neuroleptics are ongoing. Preclinical studies on the effects (behavioral toxicity) of drugs on offspring exposed *in utero* are also ongoing. The long-term objectives of these studies are to provide data for more precise risk/benefit decision making in therapeutics and to discover biochemical mechanisms which produce drug toxicities. In addition, intramural research on the toxic mechanisms of MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) on the brain are also underway.

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DOE ROLE IN THE SUPPORT OF TOXICOLOGY RESEARCH, TESTING AND METHODS DEVELOPMENT

DEPARTMENT OF ENERGY

Overview

A goal of the Department of Energy (DOE) is to provide future options for production of energy. Emphasis is placed on high risk, high long-term pay off technologies which can become attractive to the private sector for commerercialization only after research has proved their feasibility. This includes demonstration of environmental acceptability. The latter mandate requires conducting research to establish the Department's goals with minimal or acceptable health and ecological impact. The Office of Health and Environmental Research conducts research activities to identify and understand the health and environmental problems associated with energy production and use.

Long-term biological and environmental research is supported to determine the physical and chemical nature of environmental agents which are potentially toxic to living organisms; to describe their transport, chemical evolution and fate in the environment; and to understand quantitatively their effects on living organisms including humans. The program emphasizes basic research into the fundamental processes governing chemical interaction in biological systems. It also includes dose-effect relationships for differing exposure conditions. Research is also conducted to determine new insights into the mechanisms of biological response, to extend basic knowledge, and to enable understanding biological effects for exposure situations that may not be amenable to direct experimentation (such as effects produced at very low-dose exposure).

Most of the chemical toxicology efforts of two divisions of the Office of Health and Environmental Research are concerned with characterizing energy-related pollutants, products or processes, and understanding the nature of health effects caused by them. Other efforts include research on health aspects of particulates such as those from diesel exhaust emissions and new types of insulating materials, and research on metals associated with energy.

DOE research has established: (1) that only a few classes of chemicals that are in complex products, by-products and waste from synthetic fuels account for most of the mutagenic and carcinogenic activity of those mixtures; and (2) that the most potent classes of compounds are similar in all coal gasification and liquefaction processes. High molecular weight, high boiling point, nitrogen-containing polycyclic and heterocyclic aromatic compounds are the most potent components of these complex materials.

Previous DOE research has emphasized mutagenesis and carcinogenesis as crucial delayed toxicological endpoints. In FY 1987 increased emphasis is being placed on basic biological research into toxic mechanisms, including metabolism and effects on DNA.

Unique features of the DOE program are: (a) tight coupling of analytical chemistry and biological research; (b) initiation of integrated, multidisciplinary programs in interrelated laboratories; and (c) coordinated use of latest scientific technology in the national laboratory system to address significant basic questions about biological systems.

Basic Toxicology Research

Two parts of the Department of Energy toxicology program involve basic aspects of toxicology: (1) the Generic Energy Research Program, and (2) the General Life Sciences Program.

1. The Generic Energy Program includes a variety of studies aimed at understanding the mechanism of action of chemical agents found: (a) to be common to several or all fossil energy technologies (such as emission particles); (b) to be of significant concern in terms of toxicity, mutagenicity, or carcinogenicity; and (c) to be unique to energy and not of major concern to other health-oriented agencies. The research effort includes evaluations of the pharmacokinetics and metabolic transformation of these agents, studies aimed at a basic understanding of how the chemicals react with key biomolecules or receptors and how such reactions lead to health effects.

   The DOE Generic Program continues to be concerned with the toxicological properties of complex chemical mixtures which comprise important materials to which humans might be exposed as a result of energy production and use. This emphasis contrasts with other national programs concerned with evaluation of individual chemical compounds of concern to industry. Since the potency of individual toxic compounds is modified by the presence of other compounds that are components of complex chemical mixtures, research is devoted to understanding the kinds of chemical and biological interactions which modify the potency of chemicals in complex chemical mixtures.

2. A significant portion of the General Life Sciences Program is related to toxicology and probes the most basic mechanisms of biological damage at the cellular, sub-cellular and molecular level, and how living material copes with such damage (including repair). These studies utilize types of damaging agents that are most appropriate.

Toxicology Testing

The Department of Energy's counterpart of the toxicology testing program of other health-oriented agencies involves epidemiological studies. Every attempt is made to find populations that might be useful for determining the health effects that could result from exposure of worker groups or the general public to toxic chemicals associated with energy technologies. Although such populations are difficult to find, small studies are under way: (1) with groups exposed to coal combustion effluents in regions where extensive air monitoring has been in place; (2) with worker groups involved in oil shale retorting; and (3) with populations exposed to elevated levels of indoor pollutants from increased weather-proofing of buildings. By far the greatest effort is in experimental approaches designed to provide detailed information about the potential health risk of unproven technologies for which no commercial facilities are operating in this country.

Research is conducted to identify significant health problems and specific classes of chemicals responsible for those problems, and to produce dose-response data in animals for toxicological effects including mutagenesis and carcinogenesis. Some basic toxicological research is conducted in university-based laboratories.

Toxicology Methods Development

The Department of Energy supports a limited development program to bring to application reliable short-term *in vivo* and *in vitro* bioassays for identification of hazardous classes of chemicals and specific energy-related chemicals in complex materials to which people might be exposed.

Efforts have evolved from *development* of test systems to the *application* of systems in basic research efforts. Growing emphasis is placed on quantitation of comparative specific effects that the individual systems were designed to reveal and in the use of the systems as a basis for research in molecular epidemiology.

Major efforts are also placed on research to compare animal and human cell systems. These systems are to be used to develop comparative data for animal cells derived from specific tissues and in overcoming barriers that prevent the use of laboratory-based experimental data for estimating human risk.

EPA ROLE IN THE SUPPORT OF BASIC TOXICOLOGY RESEARCH, TESTING, AND METHODS DEVELOPMENT

ENVIRONMENTAL PROTECTION AGENCY

The United States Environmental Protection Agency (EPA) was created in 1970 and given the tasks of developing and enforcing environmental standards; conducting research on the causes, effects, and control of pollution; coordinating these efforts with other agencies; and assisting state and local governments and industry in the amelioration of environmental problems. Within the EPA, research is conducted by the Office of Research and Development (ORD) to provide the scientific information needed for regulatory decisions. The following legislation provides authority for EPA's research and development programs:

- The annual Environmental Research, Development, and Demonstration Act
- Clean Air Act, as amended in 1977 (P.L. 95-95)
- Federal Insecticide, Fungicide, and Rodenticide Act, as amended (P.L. 92-516)
- Federal Water Pollution Control Act (P.L. 95-500), as amended by the Clean Water Act of 1977 (P.L. 95-217)
- Marine Protection, Research and Sanctuaries Act (P.L. 92-532), as amended in March 1974 (P.L. 93-254)
- National Environmental Policy Act (P.L. 91-190), as amended in August 1975
- Public Health Service Act, as amended (P.L. 78-410)
- Resource Conservation and Recovery Act (P.L. 94-580)
- Safe Drinking Water Act (P.L. 93-523), as amended in November 1977
- Toxic Substances Control Act (P.L. 94-469).

EPA's research is committed to protecting sensitive environmental systems and safeguarding human health from pollutants. To provide the scientific framework for regulatory decisions based on risks to human health, the Office of Health Research (OHR) within ORD conducts research directly at its Health Effects Research Laboratory (HERL) or funds extramural research through grants, contracts, and cooperative agreements. Examples of the types of research sponsored by OHR include: studies to establish the dose-effect relationship between exposure to a toxicant and health effects, development of models for extrapolation from high to low doses and from animal models to humans, development of *in vivo* and *in vitro* methods for screening agents for potential health effects, development of methods to predict toxicity based on similarities in chemical structure (structure activity relationships), and evaluation of the health effects of complex mixtures of pollutants.

Much of this research is directly relevant to the National Toxicology Program's (NTP) emphasis on the testing of chemicals that can adversely affect human health and the development and validation of more effective toxicology test methods. The EPA participates on the NTP Executive Committee which identifies substances requiring toxicological and carcinogenic evaluation. Data from NTP studies are used by EPA program offices in making regulatory decisions. While this review focuses on OHR sponsored research relevant to the NTP and the budget tables reflect only OHR funding, other offices within EPA conduct toxicological research with implications for human health; but it is more difficult to segregate the resources since health effects research is frequently not the primary goal of the studies; e.g., they may be designed to gather data to evaluate risk assessment models.

EPA is also providing support for the Health Effects Institute, which is funded by EPA and the 24 automotive manufacturers or marketers in the U.S. to perform independent research. The goal of the Institute is to produce objective, high quality studies on the health effects of motor vehicle emissions. This support is not reflected in the budget tables.

Basic Toxicology Research

In considering EPA's support of basic research, it is important to note that the regulatory mission of the Agency dictates its research activities so that studies tend to focus on methods development rather than on basic research. Therefore, since it is not possible to separate out the funding for basic research no dollar figures for basic research are given in the budget tables. Through the Office of Environmental Processes and Effects Research (OEPER), ORD supports research to evaluate the significance of bioaccumulation of toxics by marine organisms with attempts to relate tissue residues to tumorigenesis and to understand the biomagnification of toxic chemicals through the food chain. Within OHR, basic research using chemical, epidemiological and toxicological approaches is underway to determine the health effects of land disposal of municipal sludge. Studies are also being conducted to determine the mechanism of action of toxicants and to investigate potential differences in toxicity due to different routes of exposure. There is also support for research on multiple exposure models to determine possible synergistic, additive, or antagonistic effects of toxic agents.

Toxicology Testing

EPA toxicology testing uses test protocols developed both within and outside EPA to provide information on the effects of chemicals in biological systems. Tests on laboratory animals, and *in vitro* tests on organ and cell cultures, as well as epidemiological studies related to chemical exposure, are included in the program.

Toxicity studies are designed to determine the toxic effects of chemicals on target organs and body systems emphasizing their neurotoxic, immunotoxic, carcinogenic, mutagenic, teratogenic, and reproductive effects. Studies include the effects of acute and chronic exposure to oxidants, hazardous air pollutants, mobile sources, gaseous, and particulate air pollutants, chemical contaminants and constituents of water supplies, pesticides, and toxic chemicals.

Toxicological testing of humans and animals exposed to oxidants, such as ozone and nitrogen dioxide, is being conducted to obtain information on a full range of health effects from such exposure. Human clinical studies are directed at describing changes in pulmonary function, biochemistry, and immunology following acute exposure with emphasis on evaluation of these effects in potentially susceptible subpopulations. Animal studies are directed at changes in pulmonary structure and blood following chronic and subchronic exposure, with emphasis on very young animals and those with preexisting lung disease. Epidemiological studies of air pollution are primarily directed toward respiratory effects but in some instances assessment of other endpoints such as cardiovascular changes and reproductive effects will be addressed.

A series of studies is being conducted to provide dose-response data on the toxicological effects of hazardous air pollutants, including nickel, lead and cadmium; and toluene is being tested as a surrogate for other volatile organic compounds in neurotoxicology studies. Priority hazardous air pollutants are evaluated in mammalian cell mutagenesis and carcinogenesis bioassays and in animal tumorigenesis studies. Neurotoxicity data of priority hazardous air pollutants are being determined in terms of dose- and time-effect relationships, age-dependent effects, and cross-species comparisons of toxic effects using behavioral, neurophysiological and chemical measurements of structure and function. Data on pulmonary dose-response effects are being obtained from lung deposition studies of radiolabeled phosgene and toluene. Pharmacokinetic studies with pulmonary and oral exposure to nickel are also being conducted.

The toxicological effects of mobile source emissions, particularly carbon monoxide, ozone, and unregulated automotive emissions, are the subject of several studies. One study is aimed at determining cardiac responses of normal and at-risk humans (patients with ischemic heart disease) to the inhalation of carbon monoxide and ozone as well as the relationship of carbon monoxide inhalation and the formation of carboxyhemoglobin.

A series of studies is being carried out with various gaseous and particulate pollutants such as SO_x, silica particles, lead, ozone, sulfur dioxide, sulfuric acid, and ammonium sulfate. These studies are directed toward providing data on: the pulmonary, biochemical and immunological effects of gases and particles in normal and asthmatic subjects and in patients with chronic obstructive lung disease; the effects of gases and particles on pulmonary function, morphology, biochemistry and immunology of normal and impaired animals; and the neurobehavioral effects of lead on exposed children and adults.

A series of studies are being conducted to determine various toxicological, carcinogenic, and mutagenic effects of contaminants and disinfectants in drinking water. Chemicals that have been identified in drinking water are screened by in vitro techniques for carcinogenic, mutagenic and reproductive activity, and chemical toxicities involving liver, kidney, cardiovascular, and central nervous systems are determined. Drinking water disinfectants and their by-products are being tested for carcinogenic, mutagenic, and direct toxicological effects on kidney, liver, and the cardiovascular system as well as for metabolic fate and pharmacokinetic values. The interactive toxicities of volatile organic compounds in drinking water on the cardiovascular system, the liver, and the kidney of the rat are being determined.

In EPA's drinking water health effects research program, clinical and epidemiological studies are being conducted to determine the association between drinking water contaminants and human health. Clinical studies investigating the dose-response effects of chlorine, chlorine dioxide, and chloramine on various cardiovascular system parameters (e.g., blood pressure, cholesterol) are underway. An epidemiology study to determine the association between drinking water disinfection and cardiovascular disease (CVD) is being supported through a cooperative agreement with Oak Ridge National Laboratories and is scheduled to be completed in 1987. Epidemiological studies to evaluate potable water contribution to indoor radon levels and radon volatilization from indoor uses are underway. Also, a study is being conducted to determine radon levels associated with radium in ground water. Finally, EPA and the National Cancer Institute are co-sponsoring an epidemiology study to determine if a relationship exists between drinking water quality and bladder, kidney, liver and colon cancer.

For pesticides and toxic substances, legislation places the primary requirement for toxicology testing of new materials on the manufacturer or registrant. Agency research in this area involves special studies of an exploratory nature and testing to validate questionable data. Toxicological studies on pesticides involve dose- and time-effect studies and include determination of sensitive age groups for setting re-entry standards. Data on toxic chemicals are gathered to produce chemical hazard identification profiles and to develop data on classes of chemicals to aid in predicting the toxicity of new chemicals of that class. Toxicity testing is also performed as part of the efforts to develop better exposure models for risk assessment.

Toxicology Methods Development

The purposes of toxicology methods development research at EPA include: development of methods for direct assessment of effects in humans as well as better model systems (cell, tissue, and animal) for extrapolation of research results to humans; assessment of the effectiveness of current health effects measurement methodologies; validation of proposed toxicology testing methods; and development and validation of predictive mathematical models of the effects of toxicants on animal systems.

The methods encompass a wide variety of health effects in several distinct areas. Health effects include biochemical effects, metabolic studies, organ toxicity, immunotoxicity, neurologic and behavioral toxicity, carcinogenesis, teratogenesis, and genetic and reproductive effects. The areas of interest include air and water quality, drinking water, exposure to gases and particles, oxidants, pesticides, hazardous waste, and toxic substances.

Methods being developed for toxicological effects of oxidants include the development and experimental validation of predictive mathematical models. Of particular concern is the development of theoretical models of respiratory tract deposition of ozone and nitrogen dioxide and the determination of species sensitivity to ozone at equivalent predicted concentrations.

In vivo and *in vitro* methods to identify potentially toxic hazardous air pollutants in ambient air and source emissions are being developed and validated, with emphasis on the quantification of the contribution of specific genotoxicants to the mutagenicity of these sources. Methodologies being developed and evaluated include air sampling methods, chemical and biological extraction methods, and *in vivo*/*in vitro* bioassays of hazardous air pollutant samples. Methods to permit more sensitive predictive neurobehavioral assays of hazardous air pollutants are also being developed, as are test procedures to evaluate the effects of potential teratogens and reproductive toxins on critical subpopulations such as the peripubertal and the aging animal.

Hazardous air pollutant sampling and bioassay methods are being developed for measuring the genotoxicity and mutagenicity of complex mixtures in indoor microenvironments, as well as from chemicals emitted into the air and/or arising from atmospheric transformation.

Another series of studies is aimed at developing theoretical models of respiratory tract deposition of SO_2, and development of instrumentation to evaluate human physiological responses to pollutants, such as SO_2 and CO. These studies involve obtaining improved data on regional deposition and physiochemistry for extrapolation of effective pollutant concentrations between animals and man, as well as validation and miniaturization of the Cardiac Exercise Stress Processor for field use.

Short-term biomonitoring techniques are being field tested and validated for water-quality screening for chemical toxicants in waters impacted by complex chemical effluents.

A number of studies are underway to develop methods to bioassay drinking water health hazards, to develop experimental models for distinguishing tumor initiating from tumor promoting chemicals in drinking water, and to provide low-dose extrapolation models. *In vivo* bioassays for drinking water health hazards are being directed primarily to nonvolatile organic material, not identifiable by gas chromatography or mass spectrometry. Validation of low-dose response extrapolations without large animal populations is achieved by use of preneoplastic responses of tissues to carcinogens of varying types.

Methods are being developed for *in vivo*/*in vitro* prescreening and toxicological characterization of potentially hazardous wastes (materials regulated under the Resource Conservation and Recovery Act (RCRA) such as raw industrial wastes, leachates, etc.). The goal of this research is to provide a validated pre-screen and toxicological confirmation screen (test battery) to be used to identify and quantify the specific toxic hazard (e.g., acute toxicity, mutagenicity, neurotoxicity, teratogenicity) posed by exposure to specific RCRA materials (raw wastes, leachates). Samples will be characterized and screened in combined *in vivo*/*in vitro* bioassays. Bioassay screens will include: gross toxicity, carcinogenicity, mutagenicity, neurotoxicity, immunotoxicity, teratogenicity and reproductive effects.

Test methods are being developed for *in vitro* predictors of the *in vivo* toxicity of polycholorinated dibenzo-*p*-dioxins and dibenzofurans in mixtures. Assays used are based on receptor binding and on induction of the monooxygenase enzymes, aryl hydrocarbon hydroxylase and ethoxyresorufin *O*-deethylase. To further predict the toxicity of untested dioxin-related compounds, causal structure-activity methods are being developed and applied to preliminary assessment and priority setting activities in *in vivo* studies. The teratogenic potential of dioxins and related compounds is being evaluated as is the potential for male-mediated adverse reproductive effects.

Methods to evaluate the toxicity, mutagenicity, and teratogenicity of pesticides, are being developed. Among other studies, this research includes the development of *in vitro* bioassays for the detection of adverse alterations in developmental and reproductive processes in animals, with particular attention to critical organ function in the neonate. Biochemical and anatomical test systems are applied to identify the principal sites and processes of neurotoxic activity of organophosphate pesticides in order to determine the relationship of indicators of neurotoxicity to disease states and/or behavioral dysfunction. The interspecies significance of teratology test data is being evaluated by a variety of comparisons in order to improve extrapolations of animal test data to human risk.

Research in support of the toxics program includes the development of a wide variety of *in vivo* and *in vitro* bioassay methods, structure activity relationship methods, and extrapolation methods to predict, detect, or measure the toxic effect of various chemical agents. The Toxic Substances Control Act (TSCA) Test Guidelines published in the *Federal Register* by the Office of Toxics Substances for use by industry in testing chemicals incorporated methods developed in EPA and other laboratories. Current research to detect the mutagenic effects of toxic chemicals is focused on the development of methods such as the mouse lymphoma assay, and the Chinese hamster ovary (CHO) cell assay which measures gross chromosomal aberrations, and sister chromatid exchanges. Alternative reproductive toxicity tests and bioassays to accurately evaluate critical organ function in the neonate following perinatal exposure to toxicants are being developed. Other assays are being developed for genetic toxicity and metabolic toxicity based on *in vivo* and *in vitro* bioassays, ranking methods, germ-cell multi-test systems, interspecies tests, and mutagenicity test batteries. Additional research is devoted to methods for assessing the response of the immune system to exposure to toxic chemicals in the environment. Neurochemical, neurophysiological, and behavioral methods for predicting the neurotoxicity of chemicals and extrapolating between effects seen in animals and man are also being studied. Structure activity relationship methods and scientific data bases are being formulated to allow prediction of the carcinogenic and mutagenic effects of chemicals based on structural, physiochemical, topographical, mechanistic, and electronic parameters. The characteristics of molecular electrostatic interaction potentials that may be useful as a premanufacture screen of potentially toxic substances are being identified to determine to what extent these characteristics may be used for that purpose in other more complicated structure activity relationship screens.

The Office of Toxic Substances (OTS) also supports a number of projects related to the health effects of chemicals in the environment. There are joint projects between OTS and HERL scientists examining the toxic effects of acrylates, azo dyes, anthraquinones, and pyridines. OTS scientists have also worked on the development of data bases for a number of toxicological endpoints. The National Human Adipose Tissue Survey and the Blood Network are funded by OTS to develop human exposure data.

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TOXICOLOGY METHODS CURRENTLY BEING DEVELOPED BY DHHS, DOE, AND EPA

TOXICOLOGY METHODS DEVELOPMENT

NATIONAL CANCER INSTITUTE

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-Term - In Vitro		
Transformation of human cells by chemical carcinogens	Carcinogenesis	To dissect the number and kinds of steps involved in carcinogen-induced neoplastic transformation of normal human diploid cells into tumor-forming cells (Michigan State University, R01-CA-21289)
Chemical carcinogen induced neoplastic transformation	Carcinogenesis	To study the *in vitro* induction of neoplastic transformation in human skin keratinocytes by chemical carcinogens (Ohio State University, R01-CA-25907)
Molecular basis of chromosome aberrations	Mutagenesis/ Carcinogenesis	To elucidate the molecular mechanisms of chromosome aberration formation in human cells by the simultaneous monitoring of induction and repair of specific DNA lesions with that of chromosome lesions (University of Texas System Cancer Center, Houston, R01-CA-27931)
Expression of genetic variation in cultured cells	Mutagenesis/ Carcinogenesis	To determine the roles of extramutational events, such as mitotic recombination, gene inactivation, chromosomal rearrangements, deletions or chromosomal segregation, in the expression of recessive mutations in cultured mammalian cells (University of Texas System Cancer Center, Houston, R01-CA-28711)
Carcinogenesis studies in cultured rat esophagus	Carcinogenesis	To develop a cell culture system for the quantitative analysis of the ability of chemical carcinogens to transform rat esophageal epithelial cells and to identify properties that correlate with the onset of transformation and the ability of these cells to produce tumors in syngeneic hosts (Medical College of Ohio, R01-CA-28950)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

NATIONAL CANCER INSTITUTE (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-Term - In Vitro (Continued)		
Carcinogen activation by cultured mammary cells	Mutagenesis/ Carcinogenesis	To develop methods to evaluate environmental mammary carcinogens and to define factors and mechanisms related to susceptibility to mammary cancer (University of Wisconsin, Madison, R01-CA-28954)
Mutagenesis by metals of environmental significance	Mutagenesis	To develop a bacterial short-term bioassay with a genetic endpoint of broad specificity for detecting carcinogenic metal compounds and to extend these studies to a mammalian cell system in order to allow the study of metal compounds that do not enter bacteria (New York University Medical Center, R01-CA-29258)
Androgens in prostatic and epididymal culture	Carcinogenesis	To develop viable prostatic organ culture systems and to use these systems to study roles of sex hormones as promoters of carcinogen-induced neoplastic transformation (Tufts University, R01 CA 29513)
Cell culture and transplantation of human hepatocytes	Carcinogenesis	To develop and characterize cell culture and transplantation systems of human hepatocytes in order to utilize these systems to answer questions relevant to liver cell growth control, regulation of biochemical phenotype expression and response to chemical carcinogens (Duke University, R01 CA 30241)
Mammary mutagenesis assays	Mutagenesis	To develop equivalent human and rat mammary gland *in vitro* cell systems that will be used for an organ-specific interspecies comparison of the interaction of chemical carcinogens with these cells (University of Wisconsin, R01-CA-30295)
Promotion of chemical carcinogenesis in uterine tissue	Carcinogenesis	To test the hypothesis that tumor promotion may be a process of selection using a previously developed *in vitro* cell culture model for the growth and transformation of human

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The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

NATIONAL CANCER INSTITUTE (continued)

Short-Term - In Vitro (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
		endometrial stromal cells (University of North Carolina, R01-CA-31733)
32P-Labeling test for nucleic acid damage by carcinogens	Mutagenesis/ Carcinogenesis	To assess the extent of chemical carcinogen damage to DNA by the postlabeling of nucleic acid digests followed by chromatography as a means of detecting and possibly quantitating carcinogen-DNA damage in animals or man exposed to unknown non-radioactive DNA damaging agents (Baylor College of Medicine, R01-CA-32157)
Error-prone DNA synthesis and oncogene mutagenesis	Mutagenesis	To construct a model system which will make it possible to assay the mutagenic potential of a variety of different cells with different physiological histories (University of Chicago, R01 CA 32436)
Mutation in human cells at DNA sequence level	Mutagenesis	To develop methods for the analysis of mutations in human cells at the DNA sequence level (Stanford University, R01-CA-33056)
Intrinsic and extrinsic tumor promoters in prostate cancer	Carcinogenesis	To develop human prostate organ and monolayer culture model systems to investigate responses to initiators and promoters that may be related to carcinogenesis (University of Colorado Health Sciences Center, R01 CA 33169)
Carcinogen-mediated genetic effects	Mutagenesis	To establish a mammalian cell system, derived from Chinese hamster V-79 cells carrying deletion mutations in the cellular thymidine kinase genes and a single copy of the HSV thymidine kinase gene for the analysis of a large variety of genetic effects following exposure to carcinogens and tumor promoters (New York University Medical Center, R01-CA-35631)

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NATIONAL CANCER INSTITUTE (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-Term - In Vitro (Continued)		
Mammalian cell assay for mutagenesis and carcinogenesis	Mutagenesis	To develop a mammalian cell assay for detecting base-substitution and frameshift mutations as well as major DNA rearrangements (University of Cincinnati, R01-CA-36897)
Molecular analysis of carcinogen-induced mutations	Mutagenesis	To determine the types of DNA sequence changes and to characterize host processes that determine the frequency or types of mutations induced in mammalian cells by chemical carcinogens and to identify the primary determinants of sequence specificity in mammalian mutagenesis (University of Wisconsin, Madison, R01-CA-37166)
In vivo/*in vitro* human T-cell environmental mutagenesis	Mutagenesis	To develop a quantitative *in vitro* assay for measuring the increase in frequency of thioguanine resistant T lymphocytes in humans exposed to environmental mutagens (Michigan State University, R01-CA-37838)
Mechanisms of mutagenesis by aflatoxin and other agents	Mutagenesis	To elucidate how chemical carcinogens cause mutations in bacteria (Boston University, R01-CA-37880)
Transformation of mammary epithelial cells *in vitro*	Carcinogenesis	To establish a transformation system *in vitro* for mammary epithelial cells that could be utilized for studies of chemical carcinogenesis at a cellular or molecular level (Baylor College of Medicine, R01 CA 38650)
Molecular basis of carcinogen induced mutagenesis	Mutagenesis	To use a defined sequence in the lac gene as a probe to analyze single and site specific mutagenesis induced by aromatic amines (Michigan Cancer Foundation, R01 CA 38844)
Mechanism of mutation induction in a mammalian gene	Mutagenesis	To define the mechanisms of N-acetoxy-2-acetylaminofluorene and benzo(a)pyrene diol epoxide-induced mutations in a gene for dihydrofolate reductase in mammalian cells (Columbia

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TOXICOLOGY METHODS DEVELOPMENT

NATIONAL CANCER INSTITUTE (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-Term - In Vitro (Continued)		
		University, R01 CA 39547)
Mutagenesis and carcinogenesis	Mutagenesis	To improve the detection and analysis of mutagens by developing a new set of bacterial strains, each of which reverts by only one specific base-pair change and to identify endogenously generated mutagens that damage human DNA (University of California, Berkeley, R35 CA 39910)
Chemical transformation of mouse epidermal keratinocytes	Carcinogenesis	To further develop the BALB/MK mouse keratinocyte model for use as a reproducible assay for chemical carcinogen-induced neoplastic transformation (Childrens Hospital of Los Angeles, R01 CA 39602)
Chemical carcinogens and frame-shift mutations in yeast	Mutagenesis	To study the mechanism and genetic control of frameshift mutagenesis in yeast by the construction of testor strains having +1 G/C and (-1) frameshift mutations (Whitehead Institute for Biomedical Research, R01 CA 39961)
Proliferative lifespan of mammary epithelial cells	Carcinogenesis	To develop an in vitro culture system to evaluate the growth factors necessary for growth control of normal, preneoplastic and neoplastic rat mammary epithelial cells (Michigan Cancer Foundation, R01 CA 40064)
DNA sequence changes in mutated mammalian cells	Mutagenesis	To determine DNA sequence changes induced by specific mutagens in the *E. coli gpt* gene, of which a single copy has been stably integrated into the genome of a line of CHO cells (Yale University, R01 CA 40195)
Molecular mechanisms of hydrocarbon DNA interactions	Mutagenesis	To study the interactions of carcinogens with DNA and the biological consequences of carcinogen-DNA adducts (Purdue

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NATIONAL CANCER INSTITUTE (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-Term - In Vitro (Continued)		
		Research Foundation, R01 CA 40228)
Transitional cell carcinomas *in vitro*/*in vivo* correlates	Carcinogenesis	To develop an *in vitro* model of transitional cell carcinomas of the urinary bladder for correlative studies with *in vivo* models (IIT Research Institute, R23 CA 40501)
Monoclonal antibodies specific for cyclic DNA adducts	Carcinogenesis/ Mutagenesis	To develop antibodies specific for six cyclic nucleoside adducts which are formed by several carcinogens with known human exposure (American Health Foundation, R01 CA 42235)
Mutagenic activity of anti-herpes drugs	Mutagenesis	To construct lines of cultured CHO and other mammalian cells that express HSV thymidine kinase and by use of these cells determine if anti-herpetic drugs cause well-defined nutritional and drug resistance markers to undergo further mutation (University of Colorado, R01 CA 42444)
Chemical carcinogenesis in human epithelial models	Carcinogenesis	To study the relationship between mutagenicity and *in vitro* cell transformation by isolating variants of carcinogen-treated human keratinocytes using selection strategies based on phenotypes of cell lines derived from naturally occurring human squamous cell carcinomas (University of Wisconsin, R01 CA 43160)
Short-Term - In Vivo		
Direct mutagenicity testing in humans	Mutagenesis	To develop and validate systems for direct *in vivo* mutagenicity testing in humans, particularly the thioguanine-resistant peripheral blood lymphocyte variant frequency assay (University of Vermont, R01-CA-30688)

The contents of this table reflect information available as of September 1986.

NATIONAL CANCER INSTITUTE (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-Term - In Vivo (continued)		
Murine lymphocyte SCE model for predicting genotoxic risk	Mutagenesis	To conduct a large survey of SCE induction in chemotherapy treated patients and mice given the same drug in order to develop some generally useful protocols for measuring genotoxic effects of chemicals (University of Pittsburgh, R01 CA 39401)
UCCRC: Etiology of treatment-induced secondary leukemia	Carcinogenesis/ Mutagenesis	A program to study the molecular mechanisms leading to secondary acute nonlymphocytic leukemia (ANLL) in patients previously treated with radiation and/or chemotherapy (University of Chicago, P01 CA 40046)
A direct test for somatic mutation *in vivo*	Mutagenesis	To develop a quantitative mutation assay for mutant cells in various tissues of mice exposed to carcinogens as detected by their resistance to protein synthesis inhibition by diptheria toxin (Hebrew University of Jerusalem, R01 CA 40922)
Long-Term - In Vivo		
Hamster model of bronchogenic carcinoma	Carcinogenesis	To continue to develop a Syrian hamster model for bronchogenic carcinoma using sustained release implants of carcinogens in silicone rubber (City of Hope Medical Center, R01 CA 29373)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

NATIONAL CANCER INSTITUTE (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Long-Term - In Vivo - In Vitro		
Survival and carcinogenesis in transplanted hepatocytes	Carcinogenesis	To study and further delineate the relative importance of initiation and promotion in hepatocarcinogenesis by using transplanted hepatocytes in a quantitative manner for potential application to the precise estimation of the carcinogenicity index of chemicals (Duke University, R01 CA 25951)
Carcinogenesis of xeno-transplanted human epithelia	Carcinogenesis	To develop an *in vitro* experimental model for toxicological and carcinogenesis studies using xenotransplanted-reconstituted human respiratory epithelia (Fox Chase Cancer Center, R01 CA 44981)

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TOXICOLOGY METHODS DEVELOPMENT

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Extramural Program		
Short-Term		
Use of plant cell culture to study genetic variation	Mutagenesis	Detection system based on hypothesis that, for gene products active as multimeric proteins, it may be possible to isolate mutants whose phenotypes appear to be dominant conditional lethals (University of Utah: R01 ES 1498)
DNA damage following exposure to genotoxins	Mutagenesis	Develop bioassays capable of determining directly the level of environmentally induced DNA damage in vivo (Ohio State University: R01 ES 2388)
International Program on Chemical Safety (IPCS)	Mutagenesis	Cooperative venture of three UN agencies in part to develop and coordinate toxicity testing on an international level (World Health Organization: U01 ES 2617)
Statistical analyses for environmental health studies	Mutagenesis	Statistically determine optimal design configurations to improve reliability and efficiency of mutagenicity test systems (Montana State University: R01 ES 3254).
Induced mutation in germinal stem cells	Mutagenesis	Evaluate Drosophila oogonial stem cell sex-linked lethal response as means to assess environmental mutagenicities (University of Wisconsin: R01 ES 3263).
In vitro spermatogenic cell genotoxicity tests	Mutagenesis	Develop an inexpensive in vitro assay system to measure ability of chemicals to induce chromosomal abnormalities in vertebrate spermatogenic cells (Cornell University Medical Center, New York, NY: R01 ES 3381)
An instrument for in vitro cytometry	Mutagenesis	Development of an inexpensive, reliable and versatile instrument for the analysis of in vitro cell populations. The

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Extramural Program		
Short-Term Continued)		
		instrument will be able to measure cell size, cell number, and subcellular structural detail while the cells remain undisturbed in the standard culture dish (Optra Inc., Peabody, Mass.: R44 ES 3316A)
Short term mutagen testing with human and murine cells	Mutagenesis	Systems will be established using mutations at the APRT locus locus in mouse TK +/- L5178Y cells and in human cell line HL-60 (Indiana University, Bloomington: R01 ES 3501)
Analysis and quantitation of mutagenesis	Mutagenesis	Various methods are combined to analyze physical, chemical, and biological agent responses in cell culture in terms of each of principal mutagenic actions (Eleanor Roosevelt Institute for Cancer Research, Denver, Co.: R01 ES 3746)
Alternative design of standard cancer bioassay	Carcinogenesis	Study key issues in the design and analysis of the carcinogen bioassay in small rodents (Harvard University: R01 ES 2709A)
Biology of hepatocarcinogenesis	Carcinogenesis	Refine the infant mouse model for hepatocarcinogenesis and characterize the microscopic hepatocellular lesions induced by single injections of carcinogens (Univ. of Wisconsin at Madison: R01 ES 3616A)
Model system to evaluate environmental carcinogens	Carcinogenesis	Development of a system, based on the chemical activation of teleost oncogenes, that could be used as a screen for potential carcinogens (Johns Hopkins University: R23 ES 3729A)
Statistical procedures for toxic substances data	Statistical Analysis/ Toxicology	Statistically determine optimal design configurations for toxic substances data (Columbia University: R01 ES 2557A)

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TOXICOLOGY METHODS DEVELOPMENT

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short-Term		
Development of embryo cell culture to identify early developmental targets and teratogenic effects of environmental chemicals	Reproductive/ Developmental Toxicity	Uses growth inhibition of established line of embryonic palatal mesenchymal cells, along with metabolic activation, as a short-term screen for potential human teratogens. Effects of direct or indirect acting teratogens will be studied (Laboratory of Reproductive and Developmental Toxicology, Z01-ES-70010).
*Fertility assessment using continuous breeding	Reproductive/ Developmental Toxicity	Test system was designed to study effects of subchronic chemical exposures on mating, fertility, and offspring survival and development in mice. Where effects are seen, target organ responses such as change in sperm number or morphology, altered vaginal cytology, or abnormal hormone patterns are being measured. Validation will continue with known reproductive toxins and negative controls (Environmental Health Research and Testing, Inc., N01-ES-2-5013; Research Triangle Institute, N01-ES-2-5014)
*Development of ovarian toxicity screening systems	Reproductive/ Developmental Toxicity	Ovaries from mice in continuous breeding studies will be examined for morphological changes and compared to chemical-related changes in fertility and reproduction (NCTR, IAA-3Y01-ES-5-0139)
*Validation of two *in vitro* cell culture systems for detecting teratogens	Reproductive/ Developmental Toxicity	Inhibition of ascites mouse ovarian tumor cell attachment and human palatal mesenchyme cell growth will continue to be measured in the presence of known teratogens and non-teratogens (Microbiological Associates, N01-ES-38045; Northrop Services, Inc., N01-ES-38046).

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TOXICOLOGY METHODS DEVELOPMENT

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
*Evaluation of *Drosophila* as a teratogen screen	Reproductive/ Developmental Toxicity	Involves exposing mated female flies to chemical in the medium and examining offspring for morphological defects (University of Alabama, 1Y01-ES-5-0135)
*Development of methods to assess toxicity of chemical mixtures	Systemic/Organ Toxicity	Initially, pilot studies will be done with primary hepatocyte cultures as well as organ cultures from other target organs (Agency for Toxic Substances and Disease Registry: IAA-222-Y03-ES-30110).
*Developing and evaluating a modified tier approach for studying mutagenic activities of cooked foods, identify the active components, their potency and spectrum of genetic toxicity, and estimate population risk	Mutagenesis	The assay consists of the Ames battery, supplemented by SCE and cultured mammalian cell specific-locus mutation assays. Chemical fractionation of complex mixtures to isolate mutagenic compounds employs chromatographic methods (Lawrence Livermore Laboratory, IAA-Y01-ES-1-0063).
*Development of *in vivo* test systems to detect mutagen-induced aneuploidy	Mutagenesis	Tests are being developed in a yeast, *Saccharomyces cerevisiae*, and *Drosophila* spp. for detection of chromosomal aneuploidy, along with gene mutation and recombination (Technische Hochschule, Darmstadt, West Germany, N01-ES-5-5126; University of California (Berkeley), N01-ES-5-5125; Brown University, N01-ES-5-5095; and University of Kentucky, N01-ES-5-5106).
*Evaluation of mouse erythrocyte micronucleus	Mutagenesis	Measures increases in frequency of micronucleated erythrocytes in smears of blood from mice exposed to various NTP chemicals,

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
assay as adjunct to rodent toxicity tests		and makes comparisons with frequencies in bone marrow cells of mice treated with single high doses of the same chemicals. Three structurally-related carcinogen/noncarcinogens are being tested to evaluate discriminating ability of the assay. (U.S. Department of Agriculture, Berkeley, CA, IAA-U01-ES-40113).
*Development of prescreen for clastogenic chemicals	Mutagenesis	Involves investigating causes of bimodal size distribution of trifluorothymidine resistant colonies from control and mutagen treated mouse lymphoma cell cultures for possible correlation of chromosome aberrations and point mutations with small colony formation (SRI International, N01-ES-28038).
Development of improved statistical techniques from laboratory animal data to estimate long-term human risk from carcinogens and teratogens	Carcinogenesis/ Teratogenesis Risk Assessment	Involves evaluation of a variety of statistical and mathematical techniques, ranging from empirical data evaluation and curve fitting to the generation of mathematical models that attempt to approximate biological mechanisms (Statistics and Biomathematics Branch, Z01-ES-41001).
Quantitative species extrapolation in carcinogenesis	Carcinogenesis/ Risk Assessment	Involves construction and updating of a large-scale computerized data base conforming to a set of acceptability criteria and using animal cancer bioassay data as well as comparison of bioassay data wtih *Salmonella* test data (Lawrence Berkeley Laboratory, IAA-222-Y01-ES-10066).
*Development of test systems to measure initiation/promotion	Carcinogenesis	Liver tumor assays for initiation/promotion are being refined and evaluated for their utility with specific chemicals that are initiators or promoters of carcinogenesis (Argonne Nation-

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*Project under the National Toxicology Program

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
		al Laboratory, Y01-ES-20091; University of Wisconsin, N01-ES-35024).
*Development of *in vitro* assays for studying organ, species, strain and individual variations in activation of chemical carcinogens	Carcinogenesis	*S. tymphimurium* or V79 cells are cultivated with intact bladder or liver cells. Cytotoxicity, SCE and mutation induction are measured in V79, and reversion in *S. tymphimurium* (Cellular and Genetic Toxicology Branch, Z01-ES-21012).
*Validation and application of morphologic specific locus test for heritable mutations	Mutagenesis	Involves testing several environmentally significant chemicals for germ cell mutations in mice, and conducting an in-depth study of germ cell mutations using N-ethyl-N-nitrosourea (Oak Ridge National Laboratory, Y01-ES-1-0067).
*Validation and application of biochemical specific locus assay for heritable mutations	Mutagenesis	Uses electrophoresis to measure changes in specific enzymes or proteins using N-ethyl-N-nitrosourea as model mutagens (Research Triangle Institute: N01-ES-55078)
*Validation and application of heritable translocation assay for germ cell mutations	Mutagenesis	Several chemicals (likely the same as used with the morphologic specific locus test) have been or will be assessed for chromosome translocation in mice. Control populations will be tested concurrently to build a historical data base (Oak Ridge National Laboratory, Y01-ES-2-0085)
*Role of nuclear magnetic resonance imaging in carcinogenesis studies	Carcinogenesis	Technique is being used to evaluate formation, growth and regression of hepatic neoplasms in rats (Chemical Pathology Branch, Z01-ES-21080)

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
*Evaluation of *in vivo* rodent cytogenetic screening systems	Mutagenesis	Involves developing a protocol for determining frequency of chromosome aberrations and SCEs in rodent bone marrow, testing its utility for detecting carcinogens/mutagens with coded chemicals and comparing with other short-term tests as to relative value (Oak Ridge Associated Universities, Y01-ES-20100; Brookhaven National Laboratory, Y01-ES-20098).
*Develop and validate laboratory methodology to assess incidence of chromosome aberrations and SCEs in humans	Mutagenesis/ Carcinogenesis	Uses peripheral human lymphocytes. Have established a standard protocol, are assessing background incidences of the two endpoints and sources of variability in different study populations (Oak Ridge National Laboratory, Y01-ES-20101); Brookhaven National Laboratory, Y01-ES-20099).
*Development of a human cell system in which metabolic activation of chemicals and measure of genetic toxicity can be done in the same cells.	Mutagenesis	Human lymphoblast or fibroblast cells will be used as target cells while fresh surgically obtained human hepatocytes will be used for metabolic activation. Attempts will be made to improve the metabolic activating capabilities of the human cells. Genetic endpoints will include mutations, sister chromatid exchanges, chromosome aberrations, unscheduled DNA synthesis and DNA repair (University of North Carolina, N01-ES-55092; Genetest Limited Partnership, N01-ES-55093; and Duke University Medical Center, N01-ES-55091).
*Develop a short-term test model for assessing effect of chemicals on expression of mononuclear cell leukemia (MNCL)	Carcinogenesis	Establish a MNCL transplant model in male F344/N rats, and characterize chemically-induced and spontaneous MNCL both morphologically and biochemically (Carcinogenesis and Toxicology Evaluation Branch, Z01-ES-21030).

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
*Develop *in vitro* tests for workplace co-carcinogens or tumor promoters	Carcinogenesis	The V79 cell metabolic cooperativity assay is being further developed and validated as an *in vitro* assay for tumor promoters (NIOSH, IAA-Y01-ES-40121).
**In vivo* determination of absorption, distribution, metabolism and excretion of selected chemicals for use in design and interpretation of chronic toxicity studies	Pharmacokinetics	Involves use of established and development of new analytical techniques for determining the degree of absorption, major tissue depots, clearance rates, degree and type of metabolism and rates and routes of excretion, also involves separation and analysis of major metabolites; (Lovelace Inhalation Toxicology Research Institute, 22Y01-ES-2-0092; Research Triangle Institute, N01-ES-1-5007; and Southern Research Institute, N01-ES-1-5008).
*Development of methods to assess metabolism of foreign chemicals by humans	Pharmacokinetics/ Metabolism	Evaluates techniques to preserve human liver specimens in a viable state for metabolism studies with various chemicals (SRI International: N01-ES-5-5109; Mayo Foundation, N01-ES-5-5110; University of Arizona, N01-ES-5-5112).
*Evaluation of micro-encapsulation as a means of incorporating unstable, volatile or unpalatable chemicals into rodent feed for toxicology studies	Pharmacokinetics Metabolism	Relative bioavailability of microencapsulated trichloroethylene compared with neat chemical given by gavage shows no significant differences in absorption. Other chemicals being evaluated include 1,1,1-trichloroethane, citral and 2-ethylhexanol. Another unicroencapsulation technique is also being evaluated for usefulness with highly reactive or unstable chemicals. (Carcinogenesis and Toxicology Evaluation Branch, Z01-ES-21050).

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
Development of new statistical methods and experimental design modifications for carcinogenesis and toxicology chronic studies	Statistical Analysis	Includes use of different mathematical statistical techniques such as mathematical modeling, maximum likelihood estimation, interval estimation, Monte Carlo simulation, logistic regression and analytical test procedures (Statistics and Biomathematics Branch, Z01-ES-45001).
*Development of appropriate statistical techniques for analysis of mutagenesis testing data	Statistical Analysis/ Mutagenesis	Employs a mixture of mechanistic and empirical modeling, together with statistical data analytic and Monte Carlo procedures in the analysis of certain microbial mutagenesis tests and mammalian cell systems, CHO and L5178Y. Current emphasis is given to develop methods for in vivo assays such as the mouse bone-marrow micronucleus assay (Statistics and Biomathematics Branch, Z01-ES-40005).
To improve existing techniques and develop new techniques for statistical analyses of epidemiological studies	Statistical Analysis/ Epidemiology	Uses both theoretical mathematical calculations and computer simulations to assess techniques (Statistics and Biomathematics Branch, Z01-ES-40004).
Development of methods for detecting genetic damage and altered chemical metabolism in human body fluids and tissues for use in studies of environmental epidemiology	Epidemiology	Involves developing and validating various short-term genetic toxicology assays, and measures of biotransformation and adapting them to field studies in exposed humans (Epidemiology Branch, Z01-ES-43008).

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Short Term (Continued)		
Development of lymphocyte markers for evaluating exposure and "biologically effective dose" of a chemical in animals and humans.	Biochemical/Cellular/ Tissue Effects Epidemiology	Uses lymphocytes and other markers to evaluate quantitative relationship between exposure dose and DNA-adduct levels in animals and defined human populations exposed to environmental agents (Epidemiology Branch, Z01-ES-46003).

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TOXICOLOGY METHODS DEVELOPMENT

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Intramural Program		
Long-Term		
Environmental health applications of mass spectrometry	Analytical Chemistry	Approach involves mass spectrometry using a variety of ion sources including electron impact, chemical ionization sampling positive or negative ions; and fast atom bombardment to measure and characterize parent compounds and metabolites of chemicals of diverse structure in environmental media or biological tissues and fluids (Laboratory of Molecular Biophysics, Z01-ES-50080).
Data and Animal Systems		
*Environmental Mutagen Information Center	Mutagenesis	Collects, organizes, stores and disseminates chemical mutagenesis information from the world's literature (Oak Ridge National Laboratory, IAA-Y01-ES-10072).
*Environmental Teratology Information Center	Teratogenesis	Collects, organizes, stores and disseminates chemical teratogenesis information from the world's literature (Oak Ridge National Laboratory, IAA-Y01-ES-4-0128).
*Maintenance of registry of persons exposed to phenoxy acid herbicides and contaminants	Toxicology	Involves development and management of a registry on worldwide human exposures to chlorinated phenoxy acid herbicides and contaminants (International Agency for Research on Cancer, ES-15009).

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TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research		
Short-Term - In Vitro		
Develop and modify microbial mutagenesis assays to detect genotoxic chemicals	Mutagenesis/ Carcinogenesis	To utilize well-developed and validated microbial assays (Salmonella/Ames) to determine the genetic activity of several metabolites of polycyclic aromatic hydrocarbons, nitroaromatic hydrocarbons, alkylating agents, and aromatic amines (NCTR #275/276/6420/6429/6386)
Develop and modify primary liver cell cultures to determine induced DNA damage and relate that damage to the carcinogenic process	Mutagenesis/ Carcinogenesis	To utilize primary hepatocyte cultures to identify metabolites of precarcinogens and elucidate DNA adducts formed and the rates and extent of repair of these adducts and detect DNA damage using techniques to identify unscheduled DNA synthesis (NCTR #6028/6097/6386/6387)
Develop and modify the CHO/ HGPRT single gene mutation assay to relate alkylation damage to gene mutation and sister chromatid exchange and cytotoxicity	Mutagenesis/ Carcinogenesis	To utilize a well-developed somatic cell system to correlate alkyl DNA adducts to single gene and chromosomal damage (NCTR #6029/6386/6420/6429)
Develop and validate methods for evaluating human cell lines in genotoxicity assays	Mutagenesis	To develop and implement methodology for assessing the human epithelial teratocarcinoma cell line, P_3, in mammalian genotoxicity assays and to validate the application of this cell line to genotoxicity assays by exposure to known mutagens and carcinogens and comparison of the response(s) to those observed in other cell lines (NCTR #6390).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research	(continued)	
Short Term - In Vitro		
Develop methods for monkey lymphocyte assays for implementation of cytogenetic studies	Mutagenesis	To establish culture methods for peripheral blood lymphocytes obtained from Rhesus monkey (*Macaca mulatta*) and to determine if these methods are sufficiently reliable for implementation of cytogenetic studies (NCTR #6361).
Short-Term - In Vitro/In Vivo		
Measurement of transport of carcinogenic nitrated aryl compounds across the placenta and mammary tissue	Carcinogenesis	To determine if 1-nitropyrene or its metabolites are transported across the murine placenta or mammary tissue into the fetus or neonate, respectively.
To study metabolic activation of arylhydroxamic acids and aromatic amines by rat Zymbal gland	Carcinogenesis	To determine the enzymatic pathways responsible for activation of aromatic amines and amides by a tissue susceptible to chemical carcinogenesis (NCTR #6124)
Measurement of DNA damage and persistence by N-hydroxy-N-formyl-2-aminofluorene in rat mammary tissue	Carcinogenesis	To understand the type of DNA adduct responsible for mammary gland carcinogenesis (NCTR #6125)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Short-Term		
Effects of aminopyrene on mechanism of 1-nitropyrene mutagenicity	Mutagenesis	To investigate the mechanism of 1-nitropyrene mutagenicity, an aminopyrene derivative will be used (NCTR #275)
Covalent DNA binding studies	Carcinogenesis	To investigate the nature of covalent binding to *in vitro* and *in vivo* DNA. A final report on an earlier study (EXP 073) has been completed (NCTR #6029, 159, 6055/416/284/351/6353/6387/6407/6420/6421/6429)
Studies on effect of chemicals on covalent binding of N-hydroxy-2-AAF to DNA	Carcinogenesis	To investigate chemicals as to their effect on covalent binding of the 2-AAF derivative, N-hydroxy-2-acetylaminofluorene, to DNA (NCTR #6094/416/6400).
Acetyltransferase catalyzed binding to DNA	Carcinogenesis	To study acetyltransferase catalyzed binding of arylamides to DNA. A final report on earlier studies (EXP 136/158) has been completed (NCTR #186/6125/6124)
Role of hepatic blood flow in the cholestatic actions of estradiol-17B-D-glucuronide in the rat	Short-Term Method	To determine if the decrease in bile flow observed following estradiol-17B-D-glucuronide ($E_2$17G) administration is related to a coincident decrease in hepatic blood flow

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The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research	(continued)	
Short-Term		
*Development of analytical procedures for the analysis of six antihistamines and metabolites in laboratory animals	Analytical Chemistry	Methods development completed for trace level analysis of doxylamine, pyrilamine, methapyrilene, thenyldiamine, tripelennamine, and chlorothen in animal feed, human urine and wastewater as prerequisites for bioassay tests. Methods development is underway for metabolites (NCTR #6773)
Development of thermospray-LC-MS for the analysis of antihistamine metabolites	Analytical Chemistry	Thermospray-liquid chromatography-mass spectrometry is being investigated as a method for the analysis of doxylamine and pyrilamine metabolites obtained from animal feeding studies (NCTR #6435)
Development of mass spectrometry (MS) and GC-MS methods for the analysis of 9 antihistamines and their metabolites	Analytical Chemistry	Chemical ionization mass spectrometry and GC-MS methods have been developed for pyrilamine, doxylamine, thenyl diamine, methapyriline, tripelennamire, chlorothen, tripolidine, promethazine and chlorpheniramine, many of their N-oxides and additional metabolites (NCTR 6039, 6273)
Development of fast atom bombardment/mass spectrometry (FAB/MS) methods for the analysis of polar metabolites of antihistamines	Analytical Chemistry/ Biochemical Toxicology	The polar metabolites of antihistamines have been investigated using FAB/MS. In the case of the glucuronide metabolites, for example, MS analysis can only be accomplished via desorption ionization, unless the metabolites are derivatized (NCTR #6273, 6385)

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*Project under the National Toxicology Program
The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
High-field NMR for structural analysis of polycyclic aromatic hydrocarbons, aromatic amines and natural products	Carcinogenesis	To determine applicability of combining high-field NMR spectroscopy measurements with resolution enhancement techniques and with low sample temperatures for structural and conformational analysis of polycyclic aromatic hydrocarbons, aromatic amines and natural products (NCTR #6077)
Development of mass spectral methods for the identification of polymeric glutathione-acetaminophen adducts.	Analytical Chemistry/ Biochemical Toxicology	Mono and diglutathione conjugates of acetaminophen and/or its dimer have been investigated using FAB/MS/MS. Collisional activation produces characteristic fragments indictive of the presence of one or two glutathione moieties based on the sequential loss of the amino acid group (NCTR #6098, 6388)
Development of mass spectral methods for the identification of polar and nonvolatile metabolites	Analytical Chemistry/ Biochemical Toxicology	Non-volatile and thermally labile metabolites, including glucuronide conjugates, glutathione conjugates, carcinogen-DNA adducts and carcinogen-peptide adducts have been examined using FAB/MS. Further, MS/MS studies often produce structurally significant fragment ions. Tandem MS/MS with FAB ionization therefore, provides both molecular weight and structural information of polar/nonvolatile metabolites which are inaccessible using routine mass spectral techniques (NCTR #6388)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Determination of DNA conformation and sequence changes resulting from treatment with aromatic amine derivatives	Mutagenesis/ Carcinogenesis	To investigate the mechanisms of genotoxicity and to determine the predictive value of these methods in estimating risks associated with exposure to more than one compound
Develop and refine the biochemical specific locus assay to detect a broad spectrum of genetic damage	Mutagenesis	To expand the number of genetic loci assessed, to decrease the false positives, and to increase our sensitivity by decreasing the CY of enzymes assessed (6080, 6093, 6122)
Ultrastructural analysis of saccharin effects on neonatal rat bladder	Pathology	To examine by electron microscopy the neonatal rat bladder for dose dependent micropathology resulting from exposure to sodium saccharin _in_ _utero_ (NCTR #417)
*Development of analytical procedures for the analysis of triprolidine and metabolites	Analytical Chemistry	Methods developed for the trace analysis of triprolidine in animal feed, human urine, and wastewater, as prerequisites for bioassay tests and pursue methods development for metabolite identification. Metabolites not scheduled
Effect of chemical structure on carcinogenic response to N-hydroxy N-acyl-2-aminofluorenes in rats _in_ _vivo_	Carcinogenesis	To determine if modification of acyl groups will alter the carcinogenic response and to correlate that effect to activation by various enzymatic activation pathways (NCTR #186)

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*Project under the National Toxicology Program

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Short-Term		
Mass spectrometry of nitro-PAHs	Carcinogenesis	Investigation of the mass spectrometry of nitro-PAHs and other substituted PAHs (NCTR #6234, #6290/275/6387/6407)
*Study structure-activity effects in rats and mice on acute/subchronic toxicological endpoints	Carcinogenesis/ Comparative Toxicology	To study the structure/activity relationships for a series of antihistamines to determine the degree of and similarity between toxicology endpoints, including neoplastic disease
Pharmacokinetics/Metabolism		
Synthesis and quantitation of metabolites and DNA adducts *in vitro*, in *Salmonella typhimurium*, and in Chinese hamster ovary cells exposed to dinitrated pyrenes	Chemistry/Metabolism	To determine if mammalian enzymes and classical nitroreductases will metabolize dinitropyrenes to products capable of binding to DNA and causing mutations (NCTR #6187/6420/6429)
Polycyclic aromatic hydrocarbon, nitroaromatic hydrocarbons, and aromatic amine studies	Pharmacokinetics/ Metabolism/Mutagenesis/ Carcinogenesis	Polycyclic aromatic hydrocarbons and amines were synthesized to study *in vitro* metabolism and/or mutagenicity and carcinogenicity (NCTR #275/276/6187/6420/6429)

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*Project under the National Toxicology Program

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Pharmacokinetics/Metabolism		
Studies on the relation between urine pH/voiding interval on DNA and hemoglobin adduct formation from aromatic amines	Pharmacokinetics/ Metabolism	To study the pharmacokinetics and metabolic activation of 4-ABP and MOCA in dogs as a function of urine pH and micturition (NCTR #6397)
Activation and deactivation of amino azo dyes	Pharmacokinetics/ Metabolism	To investigate the activation and detoxification of amino-azo dyes. A comparative metabolic class study is performed (NCTR #210)
Studies on the toxicity and metabolism of phenacetin and acetaminophen	Pharmacokinetics/ Metabolism/Mutagenesis/ System/Organ Toxicity	To study mechanism of metabolism of phenacetin and acetaminophen as it relates to their toxicities (NCTR #6098)
*_In vitro_ and _in vivo_ _metabolism_ studies with gentian violet	Pharmacokinetics/ Metabolism	To study in a comparative manner the _in vivo_ metabolism of gentian violet and to develop useful _in vitro_ assays. Total residues are measured in tissues and _metabolites_ are identified _in vivo_ (NCTR #302, 303, 6040)
*_In vitro_ and _in vivo_ _metabolism_ studies with sulfamethazine	Pharmacokinetics/ Metabolism	To study in a comparative manner the _in vivo_ metabolism of sulfamethazine and to develop useful _in vitro_ assays. Total residues are measured in tissues for _different_ chronic doses. (NCTR #347, 348)

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*Project under the National Toxicology Program
The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Pharmacokinetics/Metabolism		
CNS mediation of hepatic detoxification system	Neurologic/Behavioral Toxicity Biochemical/Cellular/Tissue Effects	To determine which of the CNS opiate receptor systems are necessary for induction of narcotic-induced reductions in hepatic glutathione. (NCTR #6378)
Pharmacokinetic modeling	Biometry/Pharmacokinetics	Evaluate the usefulness, limitations, and advantages of Michaelis-Menten kinetics in pharmacokinetic modeling (NCTR #6072)
Studies measuring the effects of caloric restriction on mixed function oxidases and other chemical metabolising enzyme systems	Metabolism/Comparative Toxicology	To study the effect of caloric restriction on major chemical metabolising systems in rats and mice (NCTR).
Immunotoxicology		
Effect of toxic compounds on developing immune systems	Immunotoxicology	To determine if the administration of phenytoin to BALB/c mice during immune ontogenesis will result in postnatal immune dysfunction. To characterize the immune dysfunction if it is produced in terms of: a) the relation of dosage and time of administration of phenytoin to the degree and type of immunologic abnormality produced; and b) the persistence of the immunologic defect in the offspring.

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TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research	(continued)	
Pharmacokinetics/Metabolism		
		To determine if the administration of phenytoin to fetal and neonatal mice will produce an increased incidence of neoplastic disease (NCTR #272)
Lindane immunotoxicology study	Immunotoxicology	To determine the effect of lindane on immunocompetence. Determine the possible effect of genotype and phenotype on the response to T-dependent and T-independent antigen and the susceptibility to lindane-mediated immunotoxicity.
Effects of a known H_1 antagonist on the immune system	Immunotoxicology	To determine if dietary exposure to pyrilamine maleate will cause adverse health effects by supressing beneficial immune functions associated with host resistance to infection and neoplasia (NCTR #6287).
Reproductive/Developmental Toxicity		
Comparison of two fetal evaluation techniques and their ability to detect malformations	Teratogenesis/ Reproductive/ Developmental Toxicology	To determine whether there is a difference in the abilities of the Wilson and Staples techniques to detect existing malformations of the heart and diaphragm in rat fetuses (NCTR #6163)
Salicylic acid pharmacokinetic/teratology study	Pharmacokinetics/ Metabolism	To compare the pharmacokinetic and teratogenic parameters after iv administration on day 10 or day 11 of gestation of 375 mg/kg salicylic acid to CD rats (NCTR #6179)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Reproductive/Developmental Toxicity		
In vitro investigation of phenytoin teratogenicity	Reproductive/ Developmental Toxicity	To determine if phenytoin or a metabolite is the ultimate teratogen in both *in vitro* and *in vivo* systems. (NCTR #6379)
Comparison of metabolism and disposition of dexamethasone and cortisol in the pregnant Rhesus monkey	Pharmacokinetics/ Metabolism	To determine the metabolic fate of dexamethasone in pregnant Rhesus monkeys and to compare the metabolism and distribution with cortisol (NCTR #6190)
Characterization of catecholaminergically-mediated changes in the swimming immobilization response in developing rats	Neurologic/Behavioral Toxicity	To examine ontogenetic changes in pharmacologically mediated effects upon the immobilization response (NCTR #6231)
Transplacental estrogen stimulation of fetal rat uterine (ornithine dearboxylase (ODC)	Reproductive/ Developmental Toxicity	To validate the comparative time course and dose responses of transplacental stimulation of ODC in the fetal rat uterus by estradiol, diethylstilbestrol, and ethynylestradiol. (NCTR #6392)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Reproductive/Developmental Toxicity		
Biochemical/Cellular Tissue Effects		
Effect of trimethyltin on regional neurotransmitter levels and receptor binding in mouse brain	Biochemical/Cellular/ Tissue Effects	To determine the effects of acute administration of trimethyltin on neurotransmitters and high affinity receptor binding in different regions of the mouse brain (NCTR #6265)
Postnatal ontogeny of estrogen binding sites	Biochemical/Cellular/ Tissue Effects	To determine if the morphological alterations and toxicological sequelae induced by estrogen administration will be correlated with continuously elevated levels of nuclear estrogen binders during the dosing period (NCTR #6065)
Interfacing the PDP 11/34 laboratory computer to the fluorescence activated cell sorter height analyzer for storage and analysis of flow cytometric data	Cell Biology/Genetic Toxicology	Design interface system following evaluation of existing equipment and determination of required modifications for compatibility, purchase hardware, and cables, fabricate interface system, develop software (NCTR #6175)
Effects of saccharin on fetal bladder	Biochemical/ Cellular Tissue	To determine the effects of *in utero* saccharin exposure on mitotic index and epithelial morphology (NCTR #417)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Biochemical/Cellular/ Tissue Effects		
Correlation of phenobarbital inducibility of hepatic enzymes with responsiveness to liver tumor promotion by phenobarbital	Biochemical/ Cellular Tissue	To characterize phenobarbital inducibility of a battery of hepatic enzymes in genetically identical subpopulations of mice which are responsive or resistant to the liver tumor promoting and body weight enhancing effects of phenobarbital. (NCTR #498)
The use of the O'Farrell two-dimensional electrophoresis technique for the detection of biochemical alterations from toxic chemicals in homogeneous populations of *in vivo* mammalian nuclei	Cell Biology/Genetic Toxicology	Homogeneous nuclear populations, collected from specific regions of the cell cycle, and in non-dividing cells are used as sources of proteins that possibly manifest aberrant metabolic changes before toxic insult is clinically evident (NCTR #6100)
Establishment of developmental profiles of hepatic detoxicating enzymes in man, the nonhuman primate and the rat	Biochemical/Cellular/ Tissue Effects	To fully estabish the developmental profile of hepatic drug metabolizing enzymes in several species by determining the ontogeny of the enzyme systems in comparison to the adult capabilities. (NCTR #6371)
Assay validation and purification of estradiol binding protein	Biochemical/Cellular/ Tissue Effects	To validate a binding assay for estradiol binding protein (E2BP) and to purify E2BP. (NCTR #6391)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research (continued)		
Acute/Chronic Toxicity		
*Gentian violet, and sulfamethazine studies	Acute/Chronic	To conduct research to determine the oncogenic, teratogenic, and toxicological characterization of these chemicals (NCTR #278/279/302/304/338/354/355/333/334/347/348/418/419/421/422/423/420)
Newborn mouse carcinogenicity bioassay of genetian violet, sulfamethazine, promoted by sodium saccharin or sodium phenobarbital	Carcinogenesis	To determine the carcinogenic potential of genetian violet and sulfamethazine in the newborn mouse bioassay. (NCTR #360/361)
Controlled genetic variation in subchronic and chronic toxicity assays	Carcinogenesis	To provide more comprehensive risk assessment by determining the variability of risk estimates by using several F-1 hybrids rather than a single F-1 hybrid and without increasing the total number of test animals used (NCTR #328)
Evaluation of DNA excision repair between species	Carcinogenesis	To evaluate DNA repair factors with regard to the extrapolation of animal data to man (NCTR #6087/6358)

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*Project under the National Toxicology Program
The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
National Center for Toxicological Research	(continued)	
Bioassay to determine the effects of interaction of aflatoxin and ammonium hydroxide in four different diets	Pathology	To compare histopathologically the tissue of animals on treated and untreated diets (IAG/USDA/NCTR #940-943)
Effect of phenotypic differences in inbred mice on susceptibility to spontaneous neoplasms and to neoplasms induced by dietary administration of lindane	Carcinogenesis	To study the effect of phenotypic differences in inbred mice on susceptibility to spontaneous and induced neoplasms (NCTR #228)
System/Organ Toxicity		
Investigations into dog bladder, liver and kidney DNA binding	System/Organ Toxicity	To investigate the potential of chemicals to bind to dog bladder and rat skin DNA (NCTR #211, 387/6400)
The role of saccharin in aromatic amine initiated oncogenesis	Carcinogenesis	To investigate the possible role of saccharin as a promoter of aromatic amine initiated oncogenesis in BALB/c mice (NCTR #258)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Devices and Radiological Health		
In Vivo		
Short Term - In Vivo	Teratogenesis	The induction of stress proteins will be related to dysmorphogenesis in rats (OST)
In Vitro		
Short Term - In Vitro	Immunotoxicology	Development of polyclonal antibodies to epithelial antigens for assessing biological responses to medical device materials (OST).
	Mutagenesis/Genetic toxicity	Evaluation of lethality and mutability changes in LY-R, LY-S and LYTK +/- cells during exposure to heavy metals (OST).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Drugs and Biologics		
Short-Term		
Electrocardiographic system for the detection of cardiac damage in lab animals used in toxicology experiments	Cardiovascular Toxicity	Develop best electrocardiogram model to detect chemically induced cardiac damage.
Develop and evaluate methods for detecting direct or indirect cardiac toxicity of drugs in animals	Cardiovascular Toxicity	Evaluate utility of isolated blood-perfused dog heart for acute and chronic toxicity testing.
Drug induced autoimmunity in mice of defined genetic background. Induction of antinuclear antibodies by mercuric chloride in mice	Immunologic Toxicity	Develop animal models for predicting drug-induced immunodeficiencies.
The effects of chemicals and drugs on intracranial pressure, cerebrospinal fluid dynamics, brain edema and the blood-brain barrier	Neurologic/Behavioral Toxicity	Develop experimental model for detection of drug effects on intracranial pressure.
Effects of oncologic drugs on mutagenesis in bacteria and mammalian cells	Mutagenesis/Genetic Toxicity	Develop methods for determining mechanisms of mutagenic effects.

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vitro		
Development of screening methods for the detection of skin sensitizing antigens	Immunologic Toxicity	Involves the characterization of protein or other macromolecules that combine with weak skin sensitizers (Division of Toxicology, Project No. to be assigned)
Studies of human skin permeation, animal models for percutaneous absorption, and theoretical modeling of skin penetration	Dermal Toxicology	Involves use of *in vitro* models to predict blood and tissue levels in man as a result of the application of substances to the skin (Division of Toxicology, 10162)
An exploration of the basis for "false negative" results in the standard "Ames Test"	Mutagenesis/ Genetic Toxicity	The basis of these anomalous results will be sought through variations in test protocols, use of alternative bacterial mutants and/or assay of the enzymes responsible for activation (Division of Toxicology, 08402)
To explore the potential of *Saccharomyces cerevisiae* strains and procedures to monitor genetic effects	Mutagenesis/ Genetic Toxicity	Involves development of methods in yeast to monitor chemical induction of aneuploidy
An organ maintenance approach for the selection of species for metabolism studies	Biochemical/Cellular/ Tissue Effects	Involves measurements of biochemical changes e.g., respiration, selected enzymes, uptake of ions, in kidney and liver cells of various species (Division of Toxicology, 09596)
To provide the capability to evaluate chemicals for their ability to induce aneuploidy in mammalian systems	Mutagenesis/Genetic Toxicology	Involves development of methodology for potential use in evaluation of aneuploid-inducing chemicals (Division of Toxicology, 08402).

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
To develop techniques for predicting toxicological problems arising from the exposure to various agents administered to a newborn	Reproductive/ Developmental Toxicity	Involves establishment of baseline values for assessment of the toxic sequel following administration of potential toxicants to sow-reared piglets and piglets fed artificial formula (Division of Toxicology, 09450).
Development of an in vitro model for studying teratogenesis	Reproductive/ Developmental Toxicity	Embryonic limb bud mesenchymal and mid brain cells grown in mass culture and involves the use of whole rat embryo culture exposed to known or suspected teratogens to determine possible biochemical mechanisms of teratogenesis and to assess the possibility of the use of this approach in toxicological evaluation (Project Number, 09450).
Development of method to determine effects of chemicals on T-cell subsets	Immunologic	This test will permit an assessment of the toxic action of chemicals on the Lyt 1 or Lyt 2 subset of T cells and develop information on the underlying mechanism of toxicity (DM, 11778).
To provide the capability to evaluate chemicals for their ability to transform cells in culture	Mutagenesis/Genetic Toxicology	Involves studies with the BALB/3T3 transformation assay and further evaluation of its potential to detect chemical carcinogens (Division of Toxicology, 08402).

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
Development of techniques to evaluate the impact of diet on cultured cardiac myocytes and their ability to recover from or sustain cell injury from stressful stimuli	Toxicology/Nutrition	Involves the isolation and culture of cardiac myocytes from hearts of different aged animals, in vitro challenge to environmental, nutritional and/or chemical stress and measurements of cytotoxicity (University of Texas at Austin. Contract No. 13467)
In Vitro - Toxicology Testing		
Mishell-Dutton system	Immunologic	This assay is complete and in-place for use on request by the NTP Immunologic Toxicity program. Simultaneous determinations of the effects of chemicals on thymus-dependent and the two subclasses of thymus-independent antigens can be made (DM, 11778)
Alpha/beta, and gamma interferon assay	Immunologic	This assay system is complete and in-place for use on request by the NTP Immunologic Toxicity program. The effect of chemicals on alpha/beta or gamma interferon production can be determined. The interferon can be typed with specific antisera and the assay standardized with International units of interferon activity (DM, 11778)

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TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Strategies for neuro-behavioral toxicity testing	Neurologic/ Behavioral Toxicity	Involves the assessment of chemically-induced changes in nervous system function in the immature and adult organism (Division of Toxicology, 08855)
Use of HPLC to detect toxic drugs in the aqueous humor and the lens	Ocular Toxicity	Involves exposure of the eye to UV light to determine accumulation and possible phototoxic effects (Division of Toxicology, 11290)
Development of an *in vivo* model for phototoxicity	Ocular Toxicity	To develop a reliable animal model for screening compounds with potential cutaneous toxicity and phototoxicity (Division of Toxicology, 08980)
Study of metabolism of topically applied chemicals	Pharmacokinetics/ Metabolism	Chemicals of interest are applied topically to the experimental animal and the metabolites are studied in expired air, different organs, blood and urine. Comparison to the oral route can be performed (Division of Toxicology, 08980)
Study of skin sensitization, skin penetration and skin irritation in man	Dermal Sensitivity	Involves obtaining experimental data on man which is used to evaluate consumer complaints (University of California, San Francisco, Contract 223-78-2014)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Development and validation of a preservative efficacy testing method for cosmetic products	Dermal Sensitivity	An investigation of frequency, symptoms and cause of cosmetic-related adverse reactions in man (University of California, San Francisco, Contract 223-78-2015)
Biochemical parameters: macromolecular biosynthesis	Biochemical/Cellular/ Tissue Effects	Designed to develop sensitive methodologies to study the subtle effects of chemical contaminants on macromolecular metabolism in animal cells, e.g., RNA, DNA (Division of Toxicology, 09596)
Biochemical parameters of toxicology: polyamine biochemistry, polyamine and ornithine decarboxylase analysis	Biochemical/Cellular/ Tissue Effects	To detect biochemical changes in cells and tissues related to cell growth and proliferation (Division of Toxicology, 09450)
Human health effects of exposure to a variety of pesticides and industrial chemicals	Epidemiology and Clinical Toxicology	Studies to determine the risk of exposure to chemicals and the risk of adverse human health effects from such exposure (Epidemiology and Clinical Toxicology)
Primary liver cancer mortality compared to incidence	Epidemiology and Clinical Toxicology	An assessment of the incidence of primary liver cancer incidence in SMSA's compared to mortality from state death records (Epidemiology Unit)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Tissue distribution of ^{14}C-cinnamic aldehyde after oral administration to rats	Pharmacokinetics/ Metabolism	It has been suggested that cinnamic aldehyde might react as an alkylating agent with macromolecules. A tissue distribution study would elucidate possible target organs or storage depots. (Division of Toxicology, Project No. 09450)
Evaluate the safety of food additives or natural contaminants in infant formulas	Biochemical/Cellular/ Tissue Effect	Involves experiments to determine target organs, biochemical parameters, appropriate dose levels, and duration of treatment for selected compounds (Division of Toxicology, 12373)
Toxicological studies of trypsin inhibitors	Toxicology/Nutrition	Effect of trypsin inhibitors on the exocrine pancreas of minipigs and rats will be evaluated (Division of Toxicology, 12373; Division of Nutrition, 12464)
Fetal distribution of xenobiotics	Pharmacokinetics/ Metabolism	To develop a model system for measuring the uptake of radiolabeled xenobiotics by dog and minipig fetuses and calculation of the placental barrier (Division of Toxicology, 09450)
A comparison of cardiovascular parameters in two strains of minipigs	Cardiovascular Toxicology	To assess the credibility of Hormel - Hanford vs. Yucatan minipigs as the best model system for investigation of cardiovascular responses in unanesthetized, restrained, animals, (Division of Toxicology, 09450).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Dietary models development	Nutrition and Toxicology	To develop and evaluate reference diets for rodents providing nutrients at marginally deficient, requirement, and excess levels for use in studies of nutrient interactions and in standard toxicological, neurobehavioral, and reproduction studies (Division of Nutrition, 00384)
Diet and brain function	Nutrition, Food Additives, and Behavior	This contract will examine the interaction between dipeptide sweetners and changes in dietary carbohydrate and protein, and the levels and turnover of brain neuro-transmitter substances (Division of Nutrition, 11585)
Effects of soy products	Nutrition, Toxicology and Metabolism	To investigate the adverse effects of various soy protein products, their components, and related substances on trace mineral nutrition and dietary balance (Division of Nutrition, 00384).
Cadmium bioavailability	Nutrition, Toxicology and Metabolism	To determine cadmium bioavailability and metabolism in the presence of increased or decreased mineral nutrients in the diet (Divison of Nutrition, 00384).
Toxicity of Tin	Nutrition and Toxicology	To investigate the toxicity of chronic ingestion of low levels of dietary tin with emphasis on effects on bone, kidney, and brain (Division of Nutrition, 09847)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Diet and Cancer	Nutrition and Toxicology	To investigate the relationships between dietary fiber and colon cancer. Several methods such as activity of thymidine kinase and mucin histochemistry of potential value as predictors of the tendency of a fiber to enhance or inhibit colon tumorigenesis are under investigation (Division of Nutrition, 09847)
Studies with acetaminophen	Nutrition and Toxicology	To investigate the effects of chronic exposure to acetaminophen on dietary methionine requirements in rodents and to determine the effects of dietary methionine on disposition of acetaminophen (Division of Nutrition, 09847)
Health effects of nutrient excess	Nutrition, Metabolism and Nutrient Toxicity	To evaluate the harmful effects of increased dietary consumption of nutrients such as vitamins A and E, manganese and selenium, as well as multivitamin and multimineral supplements (Division of Nutrition, 09847).
Effects of diet on immune response	Nutrition, Toxicology and Metabolism	To determine the effects of deficient to toxic levels of zinc, copper and selenium on immune response in animals (Division of Nutrition, 11778).
Effects of protein and vitamins on toxicologic endpoints	Nutrition, Toxicology and Metabolism	To determine impacts of different protein sources on utilization and storage of fat-soluble vitamins on toxicologic endpoints produced by fat-soluble toxicants. To establish ranges of protein and amino acids for diets used in toxicological studies (Division of Nutrition, 13456).

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Effects of perinatal factors on physical and behavioral development	Neurologic/Behavioral Toxicity	Compares differences in physical and neurobehavioral development, from birth to weaning, among rat offspring derived by caesarean and normal birth (Division of Toxicology, 08855).
Cognitive development in preweaning rats	Neurologic/Behavioral Toxicity	Validation of homing/discrimination and active avoidance tests using pharmacologic compounds that are known to be neuroactive. Development and validation of additional tests of cognitive development as time and resources permit (Division of Toxicology, 08855).
Enzyme immunoassays (EIAs) for rat serum gamma globulins and antibodies to vaccines	Immunochemistry/ Immunotoxicity	Development of EIA's for evaluation of the rat's immune responses to select test vaccines including simulated, licensed human vaccines, and evaluation of a multi-component test vaccine (Division of Toxicology, 11198).
Miniature swine model for immune response evaluation	Immunotoxicity	Determination of basal immunologic parameters, evaluation of the swine's immune responses to a battery of test antigens, evaluation of delayed hypersensitivity as a measure of immune function, and development of a positive immunosuppression control (Division of Toxicology, 11198).
Initiation and promotion of skin tumor formation by Vomitoxin	Tumorigenesis/ Dermal Toxicology	A skin painting study using the carcinogen sensitive SENCAR mouse strain to test the tumorigenic and tumor promotional capability of Vomitoxin, a mycotoxin.

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
In Vivo		
Investigation of possible artifacts introduced by surgical manipulation of animals on the pharmacokinetics of test agents	Pharmacokinetics	Examine the possible artifacts introduced by administration of anesthesia, antibiotics and surgical procedures on the pharmacokinetic properties of test compounds in the miniature pig
Assessment of the miniature pig as a pharmacokinetic model	Pharmacokinetics/ Metabolism	Samples will be taken at appropriate times during the experiment to determine the pharmacokinetics and pharmacodynamics of selected compounds in the pig, and these will be compared to the value published in the literature for humans
Epidemiologic and Clinical Methods		
Human and animal health effects from exposure to trichothecenes	Epidemiology and Clinical Toxicology	Assessment of the human epidemiology data and animal toxicology data to determine risk and levels of cancer for the trichothecenes (Epidemiology and Clinical Toxicology Unit).
Effects of chemical substances on increased risk of pancreatic, liver and bladder cancer	Epidemiology and Clinical Toxicology	Assessment of increased risk of pancreatic, liver or bladder cancer from consumption of caffeine, soy products and artificial sweeteners (Epidemiology and Clinical Toxicology).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
Epidemiologic and Clinical Methods		
Human and animal health effects from exposure to dioxins	Epidemiology and Clinical Toxicology	Continuation of epidemiologic and toxicology studies of exposure to the dioxins and outcome (Epidemiology and Clinical Toxicology Unit).
Epidemiology studies of natural toxicants and liver cancer	Epidemiology and Clinical Toxicology	Assessment of increased risk of liver cancer from exposure to natural toxicants (aflatoxins and other) (Epidemiology and Clinical Toxicology).
Association between dietary factors and cancer	Epidemiology	Assessment of NHANES and other epidemiological data to determine the possible association of dietary factors (fat, Vitamin A, fiber, etc.) with an increased or decreased risk of cancer and whether or not there appears to be an increase in U.S. cancer incidence (Division of Nutrition, 10219).
Analytical Chemistry Methods		
Extend method for 2,3,7,8-TCDD to higher chlorinated dioxins and chlorinated dibenzofurans	Analytical Chemistry	Extension of current and other methodology to furans and other dioxins is needed for fish and other foods/matrices
Development of analytical procedures for analysis of dimethyl terephthalate (DMT)	Analytical Chemistry	Methods will be developed for detection and quantitation of dimethylterephthalate in PET beverage bottles.

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
Analytical Chemistry Methods		
Study of decomposition products of BHT and Irganox 1010	Analytical Chemistry	Methods will be applied to the separation and identification of major antioxidant decomposition products in food packaging materials.
Volatiles survey in food packaging	Analytical Chemistry	Survey of selected packaging products to be conducted to obtain incidence/level data upon which to base an assessment of risk.
Determine decomposition products of antioxidants	Analytical Chemistry	To isolate and identify the major decomposition products of BHT, BHA, and TBHQ by chromatographic techniques and *in vitro* bioassay studies. Where necessary, selected compounds will be synthesized.
Analytical methodology for mycotoxins	Analytical Chemistry	Methodology for analysis of mycotoxins produced by the *Fusaria* will be further developed (i.e., tricothecenes, zearalenone, etc.)
Analytical methodology for cyclopiazonic acid	Analytical Chemistry	Cyclopiazonic acid will be isolated and purified and analytical methodology will be revised/developed.
Analytical methodology for Alternaria toxins	Analytical Chemistry	Methods will be further developed or revised for detection and quantitation of the Alternaria toxins in tomato products and grains. Methods will be applied to tomato products to determine relationship of toxins to mold counts.

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
Analytical Chemistry Methods		
Analytical methodology for pyrrolizidine alkaloids	Analytical Chemistry	Initiate studies on the composition of cruciferous food plants
Study of herbal teas	Analytical Chemistry Toxicology	Herbal tea extracts will be examined for potentially toxic components.
Analytical methodology for PSP	Analytical Chemistry	Methods (TLC, HPLC) will be further developed for detection and quantitation of the PSP toxins. Standards of the individual toxins will be purified and criteria of purity established.
Analytical methodology - seafood toxins	Analytical Chemistry	Initiate studies of the toxins produced by dinoflagellates implicated in ciguatera, diarrheic shellfish poisoning and neurotoxic shell poisons
Toxicological support	Analytical Chemistry	Chemistry support will be provided for toxicological studies on natural toxicants. Such support will include preparation and purification of the study materials, analyses of feed and tissue samples
Immunoassay methods for natural toxins	Analytical Chemistry	Immunoassays developed previously will be evaluated and tested for selected natural toxins (aflatoxins, PSP).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Food Safety and Applied Nutrition	(Continued)	
Analytical Chemistry Methods		
Analytical methodology for transformed food constituents	Analytical Chemistry	Continuation of methods development for trans-fatty acid and cholesterol oxide analyses (Division of Nutrition, 07772)
Develop methods to identify and quantify the components in color additives	Analytical Chemistry	This is a continuing project to update existing methods and to develop new methods for certification purposes and for use in obtaining data to be used in regulatory decision making or for use in research studies (CFSAN/FDA #01014)
Develop methods to identify and quantify color additives in foods, drugs, and cosmetics	Analytical Chemistry	This is a project to provide FDA with accurate and efficient methods for the determination of compliance of color additive use. We are now introducing high performance liquid chromatography in the analytical scheme (CFSAN/FDA #01014)
Investigation of mutagens and carcinogens in color additives	Analytical Chemistry	Collaborative effort with the Division of Toxicology to provide analytical and chemistry support in several studies to isolate and identify mutagenic and carcinogenic constituents in color additives
Application of pattern recognition techniques to the analysis of orange juice	Analytical Chemistry	Pattern recognition techniques will be applied to the detection of adulterated orange juice. Data used will include IR, GC, HPLC, synchronous scan fluorescence spectra and elemental analysis by ICP.

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Veterinary Medicine		
In Vitro		
Interlaboratory testing of aquatic model ecosystem protocol	Multi-trophic level bioassay	The objectives of this project are: (1) to conduct an interlaboratory standardization trial of a microcosm method developed under FDA contracts 223-76-8348 and 223-80-2352, and (2) to increase the power of the method to predict specific ecosystem-level effects (contractor to be selected, CVM-7-83)
In Vivo		
Development of an animal model for drug-induced aplastic anemia	Acute Toxicity	The major goal is to develop an animal model that reproducibly mimics the irreversible aplastic anemia seen in humans after exposure to chloramphenicol and other drugs, e.g., sulfonamides. This would allow the Agency to develop guidelines for testing the toxicity of these types of drugs since there are no available models or suitable target animals at the present time.
Analytical Chemistry Methods		
Development of analytical method for chloramphenicol and its metabolites	Analytical Chemistry	Involves the development of a GLC method for chloramphenicol and its metabolites in tissues and body fluids (DVMR, 233)

The contents of this table reflect information available as of September 1986.

FOOD AND DRUG ADMINISTRATION (continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Center for Veterinary Medicine (Continued)		
Analytical Chemistry Methods		
Development of HPLC method for the separation of streptomycin and dihydrostreptomycin from other aminoglycoside drugs	Analytical Chemistry	Initially, attempts will be made to separate streptomycin, dihydrostreptomycin and neomycin. Chemical derivation to produce fluorescent compounds with fluorescamine, o-phthaldehyde or dansylchloride will be applied to achieve enhanced sensitivity (DVMR, 254)
Evaluation and updating of analytical methods for tissues	Analytical Chemistry	The primary objectives of this project are to evaluate and update analytical methods for drugs in tissues that were approved prior to 1974. Some of these methods lack only a confirmatory procedure, or need an improved quantitative step. Other methods may need more method trial data
Method development for drugs in animal tissues	Analytical Chemistry	The long range goal is to improve upon the analytical methods that are available for the assay of drug residues in animal tissues. Substantially improved methodology could be approved by the Center for Veterinary Medicine for regulatory use
Analysis of drugs and metabolites in tissues by MS/MS	Analytical Chemistry	The primary objective is to develop methods for drug residues in food animal products. This methodology is based on the use of solid phase extraction (SPE) columns and tandem mass spectrometric (MS/MS) technologies
Development and improvement of analytical methods for drug residues in animal tissues	Analytical Chemistry	The primary objectives are to develop or improve tissue extraction, cleanup and quantitative procedures, including multi-residue methods. Studies designed to test and evaluate the reliability, performance and practicality of immunoassays will also be conducted

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The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

CENTERS FOR DISEASE CONTROL/NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short Term		
*Methodologies for worksite neurotoxicity evaluations	Neurologic/Behavioral Toxicity	The project will lead to prescribed tests for evaluating workspace exposure to neurotoxicants. (Division of Biomedical and Behavioral Science - Project VOB BHK 248).
*Biological monitoring	Biochemical/Cellular/ Tissue Effects	Methods will be developed for monitoring worker's absorption of glycol ethers, MBOCA, and m-DET (Division of Biomedical and Behavioral Science - Project VOT EMK 378).
*Semen analysis	Reproductive Developmental Toxicity	New methods for quantitatively measuring semen quality will be evaluated and normal values determined (Division of Biomedical and Behavioral Science - Project VOO BGB 307).
*Health risk messages - field trials	Carcinogenesis	Guidelines for constructing health risk messages have been developed. These will be tested for their effectiveness in informing workers of cancer risk in select worksites (Division of Biomedical and Behavioral Science - Project VOB CCL 253).
*Biomonitoring for methyl ethyl ketone	Biochemical/Cellular/ Tissue Effects	A method for measuring uptake and body burden in connection with neurobehavioral studies will be developed (Division of Biomedical and Behavioral Science - Project VOT BHK 388).
*Aryl amines adduct in blood	Biochemical/Cellular/ Tissue Effects	A method will be developed to monitor exposure to aryl amines through blood adduct measurement (Division of Biomedical and Behavioral Science - Project VOO CCK 314).

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*Project under the National Toxicology Program
The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

CENTERS FOR DISEASE CONTROL/NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In Vitro		
*Identifying workplace co-carcinogens by in vitro tests	Carcinogenesis	Project will evaluate existing in vitro systems used for identifying cocarcinogens. Ultimate goal is to develop a tiered, rapid screen for workplace cocarcinogens (Division of Biomedical and Behavioral Science - Project VOO CCK 343)
*Short-term assay for lung toxicity	Pulmonary Toxicity	In-vitro, short-term assays for lung toxicity will be selected and evaluated (Division of Biomedical and Behavioral Science - Project VOT BAK 346)
Mouse epidermal cells for detecting contact allergens	Cutaneous	The feasibility of using chemically induced changes of mouse epidermal cell populations to screen for potential contact allergens and chemicals capable of modulating the allergic contact dermatitis response will be evaluated. (Division of Biomedical and Behavioral Science - Project VOO CJK 289)
Multiple end-point genotoxicity assay system in lung cells	Cutaneous	Development of a system for studying the genotoxicity of industrial chemicals in lung cells using multiple genetic endpoints will be initiated. The unscheduled DNA synthesis assay system using alveolar macrophages and/or other primary lung cells will be established. (Division of Respiratory Disease Studies)
In Vivo		
*Investigation of Drosophila for teratogenesis screening	Teratogenesis	The potential use of Drosophila melanogaster for prediction of teratogenesis will be evaluated (Division of Biomedical and Behavioral Science - Project VOO CGK 344).

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*Project under the National Toxicology Program
The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

CENTERS FOR DISEASE CONTROL/NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In Vivo		
*Biomonitoring of exposure to asphalt and coal tar	Carcinogenesis	The project will develop biological monitoring methods for assessment of workers exposure to coal tar pitch and asphalt (Division of Biomedical and Behavioral Science - Project VOT BCK 392).

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*Project under the National Toxicology Program
The contents of this table reflect information available as of September 1986.

CENTERS FOR DISEASE CONTROL/CENTER FOR ENVIRONMENTAL HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Division of Environmental Health Laboratory Sciences		
The assessment of human variability by two-dimensional gel electrophoresis (2DE)	Biochemical/Cellular/ Tissue Effects	To evaluate and improve the 2DE method for the analysis of protein patterns in biological samples. To compare protein patterns from urine, serum, and other fluids and tissue samples from toxicant exposed or diseased patients to normal or control samples. To specifically identify protein markers to attempt to further elucidate the mechanism of toxicity or disease processes
The diagnostic significance of urinary apolipoproteins and their isoforms	Biochemical/Cellular/ Tissue Effects	To develop and validate an assay system to assess renal damage and aid in prediction of adverse health effects to determine if urinary apolipoproteins are affected by progressive chronic kidney disease or exposure to environmental toxicants
Evaluation of pseudouridine as a marker for estimation of the glomerular filtration rate (GFR)	Biochemical/Cellular/ Tissue Effects	To evaluate the use of pseudouridine clearance as an accurate and sensitive estimate of glomerular damage GFR is important both in the diagnosis of kidney damage and in monitoring therapy
Assessment of health effects: hepatic, renal and cell damage, serum and urine profiles	Biochemical/Cellular/ Tissue Effects	To develop and validate a group of assays to assess liver, kidney and cellular injury, and to obtain values for a normal population. To determine if assays can identify chronic disease at an early stage, or predict adverse health effects of toxicant exposure

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The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

CENTERS FOR DISEASE CONTROL/CENTER FOR ENVIRONMENTAL HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Division of Environmental Health Laboratory Sciences		
Renal function-tubular and glomerular function assessment	Biochemical/Cellular/ Tissue Effects	To develop improved methods for urinary and serum hydroxyproline and determine the efficacy of using the assays as an indicator of GFR. To develop an assay for urinary metallothionein and assess its efficacy as a potential marker of toxicity
Lipoproteins, apolipoproteins and isoforms as markers of coronary heart disease and toxicant exposure	Biochemical/Cellular/ Tissue Effects	To assess the apolipoprotein content, quantitative ratios of apolipoproteins and isoform distribution in free living individuals and those at risk for chronic coronary disease and others exposed to environmental toxicants
Immunofunctional analysis and immunology studies using the fluorescent activated flow cytometer	Immunotoxicology	To develop new methods using fluorescent activated flow cytometry techniques to assay for immunocyte sub-populations in blood and to ascertain immunological competence of individuals exposed to environmental toxicants
Chromosome breakage in smokers and non-smokers	Mutagenesis/ Genetic Toxicity	To evaluate the 96 hour, low folic acid medium for the assessment of chromosome breakage in an exposed population. To develop a system with greater sensitivity to detect genetic damage
DNA strand breakage analysis of purified lymphocytes	Mutagenesis/ Genetic Toxicity	To demonstrate the utility of DNA strand breakage analysis as an indicator of DNA damage in purified lumphocytes. Develop DNA strand breakage methods for use as an indicator of *in vivo* exposure to a genotoxicant

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The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

CENTERS FOR DISEASE CONTROL/CENTER FOR ENVIRONMENTAL HEALTH

Methods Division of Environmental Health Laboratory Sciences	Area	Abbreviated Summary (Performing Organization and Project No.)
The human granulocyte: a biological monitor of environmental toxicant exposure	Mutagenesis/Genetic Toxicity	To evaluate the use of the analysis of human neutrophils as a biological indicator of exposure to environmental toxicants and mutagens
Biochemical indicators of tobacco exposure	Analytical Chemistry	To develop reliable tests for measuring cotinine and other analytes in biological specimens which reflect the use of tobacco. To use the tests to support clinical studies designed to examine the effects of tobacco exposure
Assessment of human exposure to persistent halogenated pesticides and biphenyls	Analytical Chemistry	To develop methods with improved accuracy and precision to determine persistent halogenated xenobiotics. To determine reference ranges of these toxicants in selected populations. To determine the partition of these toxicants in the human body.
Development of multi-analyte procedures for assessing human exposure to selected non-persistent synthetic chemicals	Analytical Chemistry	To develop reliable and sensitive analytical procedures for the simultaneous measurement of selected phenols, herbicides, carbamates, organophosphates, aromatic amines and their metabolites
Determination of naturally occurring toxicants and related compounds in human specimens	Analytical Chemistry	To develop a method to simultaneously analyze for the presence of aflatoxin B1, and its metabolites in biological specimens. To develop a method for the analysis of a-zeanalanol and related compounds in urine

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The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

CENTERS FOR DISEASE CONTROL/CENTER FOR ENVIRONMENTAL HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Division of Environmental Health Laboratory Sciences		
Synthesis program	Analytical Chemistry	To synthesize, purify and characterize all tetrachlorinated dibenzodioxins and furans, and all 2,3,7,8 polychlorinated dibenzodioxins and furans
Development of an analytical method to determine dibenzo-p-dioxins, dibenzofurans and related compounds in biological specimens	Analytical Chemistry	To develop the laboratory capability to accurately identify and quantitatively measure the levels of dibenzodioxins, and related compounds in adipose tissue, serum, and other biological specimens at the low parts-per-trillion and parts-per-quadrillion levels
Analytical methods to determine trace, essential and toxic elements in biological specimens	Analytical Chemistry	To develop and validate methods for toxic and essential elements which will allow exposure assessment, nutritional status, or body burden determination for a wide variety of health studies

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TOXICOLOGY METHODS DEVELOPMENT

NATIONAL INSTITUTE OF MENTAL HEALTH

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Epidemiologic study of incidence and risk factors	Tardive Dyskinesia	To study prospectively the development of tardive dyskinesia in a large sample of psychiatric patients receiving neuroleptic medication (L.I. Jewish-Hillside Medical Center, 2R01-MH32369-06)
Psychometric study of rating scales for assessing side effects in clinical trials	Assessment Methodology	To provide a psychometric analysis of a new side effects (adverse reactions) rating scale in terms of its reliability (both test-retest and interrater) and its validity (both in relation to standard scales and the new scale's capacity to differentiate among treatments and drug dosages) (Tennessee Neuropsychiatric Institute, 5R01-MH38768-08)
Long-term study of tardive dyskinesia	Central Nervous System Toxicity	To develop methods of predicting susceptibility to neuroleptics (Medical Science Foundation of Oregon, 5R01-MH36657-05)
Tardive dyskinesia	Central Nervous System Toxicity	To develop an animal model of tardive dyskinesia (Rush Presbyterian, St. Lukes MH41274)
Developmental toxicity	Behavioral Toxicity	To examine offspring exposed in utero to stress or diazepam - for behavioral or neurochemical deficits (University of Rochester, 5R01-MH31850-07)
Behavioral toxicity	Central Nervous System Toxicity	To examine toxic effects of neuroleptics on behavior (Res. Foundation for Mental Hygiene MH39057)
Clinical trial of two doses of lithium	Renal Toxicity	To study long term effects of two doses of lithium--standard and reduced--to determine effects on renal concentrating ability (Long Island Jewish Hillside Hospital and Harvard Medical School 2MH37576 and 2MH37587)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

DEPARTMENT OF ENERGY

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Detection of disease-related abnormal human proteins	Toxicology	This task concerns the Human Protein Index. The Human Protein Index will assist in the detection of new proteins and will assist in the discovery of disease- or injury-associated changes in cell or tissue protein production. Two-dimensional electrophoretic maps have been prepared of human peripheral blood lymphocytes, tissue-culture fibroblasts, muscle, red cell lysates, plasma, urinary proteins, and seminal plasma. Methods for identifying known proteins in the maps have been developed (RPIS 2454 - Argonne National Laboratory)
In Vitro		
Development of rat tracheal implant system to assess toxic and carcinogenic effects of chemicals, singly or in combination, and in differing physical forms	Carcinogenesis/ Pulmonary Toxicity	The aim of this project is to determine the toxic and carcinogenic effects on rat tracheas of two major pollutants in the environment, formaldehyde (HCHO) and benzo(a)pyrene (BAp), when they are delivered separately or in combinations and in different physical forms (adsorbed to particles, aerosols) to the mucosa in an open-ended, flow-through tracheal implant system. The uptake and retention by the tracheas of (^{3}H) Bap and (^{14}C) HCHO delivered in the various physical forms will be measured and correlated to tumorigenicity. Tumor development will be followed by cytopathologic diagnosis of the cells exfoliating into the tracheal lumens, and will be verified by periodic sampling of tracheas for histopathology. These studies should demonstrate the potential of this experimental system for determining the toxic and carcinogenic effects of other hazardous agents on the respiratory system (RPIS 4305 - Oak Ridge National Laboratory).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

DEPARTMENT OF ENERGY

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Development of *in vitro* mutagenicity test systems using T-lymphocytes	Mutagenesis/Genetic Toxicity	Primary objectives of this project are: (1) development of an *in vitro* mutagenicity test system using human T-lymphocytes and (2) use of the system for human testing. One goal of testing is to define human heterogeneity as to mutability or susceptibility to mutagens. The method involves plating cells in limiting dilutions into wells of microtiter plates in the presence or absence of 6-thioguanine, the selective agent. Culture conditions have been standardized to allow long-term T-cell growth *in vitro* in T-cell growth-factor-supplemented medium. Cells from various individuals will be used to determine the spontaneous and chemical- or irradiation-induced mutations arising *in vitro* in these T-lymphocytes, and have been quantified. Values from *in vitro* studies will be compared with *in vivo* mutant T-cell frequencies for the same persons, providing overall individual mutagenicity profiles. Mutant T-lymphocytes recovered from *in vitro* mutagenesis experiments will be fully characterized including, where possible, determinations of the molecular bases of DNA and mRNA lesions by Southern and Northern blot analyses, respectively. Initial studies have used gamma irradiation, resulting in an increase in the mutant frequency. Conditions necessary for optimal phenotype expression and maximum mutant selection have been defined. Analysis of the hprt DNA in the mutants is in progress (RPIS 9119 - University of Vermont)

The contents of this table reflect information available as of September 1986.

DEPARTMENT OF ENERGY

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Rapid transformation Assay	Mutagenesis/ Carcinogenesis	The objective is to develop a protocol for detecting carcinogen-induced transformation *in vitro* of human mammary epithelial cells (HMEC) to use in a simple, rapid quantitative assay for determining which agents, alone or in combination, may be capable of inducing human carcinoma. Previous work yielded a well-characterized HMEC culture system that provides most of the necessary prerequisites for achieving transformation *in vitro*. A large bank of frozen primary cells from donors of all ages and pathologies exists, allowing repeated experiments with the same cell population. Findings are that: (1) normal HMEC can be made to proliferate rapidly both in mass culture and as colonies up to 20 passages; (2) cells have markers that identify them as mammary and epithelial; (3) the HMEC have been shown to rapidly metabolize benzo(a)pyrene (BaP), forming products and DNA adducts in a pattern similar to that found in cells transformable *in vitro*; and (4) tumor-associated markers have been identified for the HMEC that may permit quantitative selection and detection of transformed cells. At least two BaP-induced cell lines have been developed, with properties that distinguish them from normal cells (morphology, karyology, expression of specific antigens, glucose metabolism, x-ray sensitivity). (RPIS 4296 - Lawrence Berkeley Laboratory)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

DEPARTMENT OF ENERGY

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In Vivo - In Vitro		
Testing - genetics and mutations	Development and Validation	Are developing an in vivo mouse system to identify and measure new inversion mutations. Also are using the testes of male offspring as an indicator system to identify reverse mutations which could occur following mutation induction by administration of ethylnitrosourea to the sires of the offspring (Jackson Laboratory - RPIS 8948)
Determination of toxicity and carcinogenicity of complex mixture of chemicals in maternal animals and their conceptuses	Reproductive/Developmental Toxicity Carcinogenesis	This project is to obtain information on the consequences, in animals, of maternal exposure to chemical complex mixtures, relative to health of dams and/or their conceptuses. Studies are being done to determine whether the reproductive capacity of the female rat is altered by exposure to complex mixtures of synfuel derivation. Other studies will determine whether these materials act as cross-placental carcinogens and whether prenatal or perinatal exposure results in persistent changes in detoxifying enzymes in the offspring (RPIS 2714 - Pacific Northwest Laboratory).

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

ENVIRONMENTAL PROTECTION AGENCY

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Predictive mathematical modeling	Respiratory Toxicity	The objectives are to develop theoretical models of respiratory tract deposition of ozone and nitrogen dioxide, to experimentally validate a theoretical model for ozone uptake, and to determine species sensitivity to ozone at equivalent predicted concentrations (HERL/A101A3101)
In vitro, *in vivo* methods to identify toxic hazardous air pollutants	Genetic Toxicity/ Carcinogenesis/ Mutagenesis/ Teratogenesis	The objectives are to develop and validate methods to identify potentially toxic components in ambient air and source emissions and to quantify the contribution of specific genotoxicants to the mutagenicity of source emissions and ambient air. Procedure involves development and evaluation of air sampling methodologies, chemical and biological extraction methods, and *in vitro*/*in vivo* bioassay of hazardous air pollutants (HERL/A101C4401)
Integrated air-cancer methods	Mutagenesis/ Carcinogenesis	The objective is to develop the scientific methods and data bases for identifiying the major sources of carcinogenic chemicals emitted into the air and/or arising from atmospheric transformation. This research will also be designed to improve the methodology and data base for assessing human exposure and risk to airborne carcinogens (HERL/A101C8701,
In vivo short-term response indicators development	Neurotoxicity	The objective is to determine the relationship of indicators of neurotoxicity to disease states and/or neurobehavioral dysfunction which will permit development of more sensitive predictive neurobehavioral assays of toxic chemicals (HERL/A101C4301)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Predictive models to assess dose-response effects of gases and particulates	Respiratory Tract and Pulmonary Toxicity	The objectives are to develop theoretical models of respiratory tract deposition of SO_2 and to improve regional deposition and physiochemical data for extrapolation of effective pollutant concentrations between animals and humans (HERL/A101A3401)
In vivo physiological monitoring methods	Cardiovascular Toxicity/ Pulmonary Toxicity	The objective is to develop instrumentation and methods to evaluate the physiological responses of humans to pollutants such as SO_2 and CO in order to assess human health risk. The Cardiac Exercise Stress Processor (CESP) is being validated and miniaturized for field use (HERL/A101A3501)
Short-term biomonitoring techniques for water quality	Chemical Toxicants	The objective is to provide field tested and validated biomonitoring techniques for health evaluation of waters impacted by complex chemical effluents (HERL/B101A0601)
In vivo bioassay for drinking water health hazards	Carcinogenesis/ Target Organ Toxicity	The objective is to develop, validate, and apply a methodology for assessing the overall health hazards presented by the bulk of organic material present in drinking water. Over 90% of this material is non-volatile and thus not identifiable by gas chromatography or mass spectroscopy. Qualitative indicators are used to identify biologically active chemicals. *In vivo* assays of mixtures and/or individual chemicals are used to quantify risks (HERL/C104D6201)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Use of experimental models to distinguish tumor initiating from tumor promoting chemicals	Carcinogenesis/ Target Organ Tumorigenesis	The objectives are to develop methods that establish whether a chemical produces cancer by tumor initiating (genotoxic) or tumor promoting (non-genotoxic) mechanisms and to determine the extent to which this differentiation should affect low-dose extrapolations of data. Use is being made of experimental models reported in the literature (HERL/C104D6202)
In vivo/*in vitro* extrapolation models	Genetic Toxicology/ Carcinogenesis	The objective is to provide a biological basis for the use of cross-species and low-dose extrapolation models. Use will be made of preneoplastic responses of tissues to chemical carcinogens of varying types (i.e. initiators, promoters, and cocarcinogens) to obtain low-dose response rates in small number of animals. A cross-species extrapolation will be validated through *in vitro* comparisons of target tissues from man vs. experimental animals (HERL/C104D6202)
In vivo and *in vitro* bioassays	Reproductive Toxicity/ Teratology	The objective is to develop bioassays for the detection of adverse alterations in developmental and reproductive processes in animals, with specific attention to alternative reproductive toxicity tests and bioassays to provide accurate evaluations of critical organ function in the neonate (HERL/E104A0201)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In vivo, *in vitro* testing methods	Teratogenesis/ Reproductive Toxicity	The objective is to develop and validate methods to identify potential teratogens and reproductive toxins in ambient air and source emissions. This includes: development of cost-effective screening procedures to identify toxins requiring further testing and eliminate those with no apparent toxicity; development of test procedures to evaluate critical subpopulations, such as the peri-pubertal and the aging animal; and development of *in vitro* procedures which will allow extrapolation of test data to other species including man (HERL/A101C4401)
In vivo, *in vitro* mutagenicity test battery	Genetic Toxicity	The objective is the development, validation, and implementation of techniques for determining genetic effects of human exposure to chemical carcinogens and mutagens. Estimates of exposure and dosimetric studies of DNA adduct formation provide quantitative bases for the extrapolation of data from whole animal systems to humans (HERL/E104A0203)
In vivo, *in vitro* biochemical and anatomical test systems	Neurotoxicity/ Behavioral Dysfunction	Biochemical and anatomical test systems are applied to identify the principal sites and processes of neurotoxic activity of pesticides in order to determine the relationship of indicators of neurotoxicity to disease states and/or behavioral dysfunction (HERL/E104A0204)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In vivo, in vitro pesticides risk models	Teratogenesis/ Reproductive Toxicity	The objective is to gain a better understanding of the biological significance of teratology/reproductive test data. Interspecies differences in the dermal penetration of pesticides, structure-activity relationships in teratogenesis, and potential interactions between alterations in maternal health status will be evaluated (HERL/E104B0501)
In vivo, in vitro detection methodology	Carcinogenesis	The objective is to develop rapid, sensitive and accurate methods to detect pulmonary carcinogens using rodent and human pulmonary target tissues in vivo and in vitro. In vitro methods include pulmonary tissue cultures from treated and untreated rodents and incorporation of human tissues and cells as activation and target components of carcinogenesis bioassays. In vivo methods include development of more sensitive animal strains to increase responsiveness of pulmonary tissue to carcinogen treatment (HERL/L104A0301)
In vitro oncogenic transformation bioassay	Carcinogenesis	The objective is to develop methods to improve the sensitivity of oncogenic cell transformation bioasssay systems towards all classes of carcinogens. Approaches include presensitization of cells with chemicals or hormones; addition of exogenous metabolic activation enzyme fractions; cell/cell co-cultivation systems; and cell-hybrids for improved metabolic activation. Additional studies determine the usefulness of these cells in evaluating multiple-chemical exposure effects to identify chemicals as carcinogens, co-carcinogens, or tumor promoters (HERL/L104A0302)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In vitro metabolic activation systems	Genetic Toxicity/ Carcinogenesis/ Mutagenesis	The objective is to obtain improved metabolic activation systems that activate and detoxify chemical carcinogens and mutagens in order to improve genetic toxicology bioassay systems which utilize metabolic activation. Includes an examination of major classes of chemical carcinogens and mutagens with regard to metabolism, detoxification, and metabolic activation pathways. Organ, species, and strain effects as well as effects of inducers on components of metabolic activation/detoxification pathways are applied to performance of genetic toxicology bioassays (HERL/L104A0303)
In vivo, *in vitro* cytogenetic tests for detecting chromosome damage	Genetic Toxicity/ Mutagenesis/ Carcinogenesis	The objectives are to expand and improve cytogenetic methods for evaluating genotoxic chemical effects and to characterize mechanisms, expressions, and sensitivities of induced chromosome aberrations and sister chromatid exchange frequencies. *In vitro* development includes rodent cell cultures with multiple activation and endpoint capabilities as well as both human and rodent lymphocyte systems incorporating chromosomal and gene-level criteria for monitoring damage. *In vivo* development includes use of rats, mice, and hamsters for species, strain, and tissue comparisons of carcinogen-induced cytogenetic damage (HERL/L104A0305)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Multi-end point mammalian cell mutation system	Genetic Toxicity/ Mutagenesis	The objective is to provide a test method to detect the mutagenic effects of toxic chemicals based on the L5178YTK +/- mouse lymphoma assay for detecting genetic damage. Cytogenetic analyses are used to determine if mutants deficient in thymidine kinase represent both single gene and chromosomal mutation. The assay also includes gross chromosomal aberrations and sister chromatid exchange. Specific compounds are tested in the multi-endpoint assay and results compared among the types of genetic damage measured (HERL/L104A0307)
Alternate reproductive and teratology bioassay systems	Reproductive Toxicity/ Teratogenesis	The objectives are to develop alternate reproductive toxicity tests and bioassays to accurately evaluate neonate critical organ function. Development involves identification of a laboratory model that mimics the functions to be assayed. A series of agents are tested in the model system at varying dose levels, and the bioassay is independently verified at another laboratory (HERL/L104A0308)
Bioassays for immune system toxicity	Immunological Toxicity	The objectives are to provide bioassays to screen and evaluate chemicals for immunotoxic effects based on resistance to bacterial and viral infections. Noninvasive assays of immunotoxicity in animals are correlated to human immunotoxicity endpoints. The bioassays will be validated for use as screening methods for immunotoxicity (HERL/L104A0310)
In vivo, _in vitro_ methods to detect neurotoxicity	Neurotoxicity/ Neurobehavior	The objective is to develop and validate neurobiological methods for cost effective and sensitive testing of neurotoxicity based on a multidisciplinary approach using neurophysiological, behavioral, neurochemical and neuropathological techniques (HERL/L104A0311)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Structure activity relationship methods to predict genetic toxicity	Genetic Toxicity/ Carcinogenesis/ Mutagenesis	The objective is the development of structure activity relationship methods and scientific data bases which will allow an accurate prediction of the carcinogenic and mutagenic effects of chemicals based on structural, physiochemical, topographical, mechanistic, and electronic parameters HERL/L104G1901)
Molecular electrostatic interaction potentials as a screening technique for untested chemicals	Toxic Screening	The objectives are to determine what characteristics of molecular electrostatic interaction potentials may be useful as a premanufacture screen of potentially toxic substances and to determine to what extent these characteristics may be used for that purpose in other more complicated structure activity relationship schemes (HERL/L104G1902)
Short-term *in vitro*, *in vivo* bioassay	Carcinogenesis	The objective is to develop and validate new approaches to assessing cancer risk. Human carcinogens with established epidemiological links are bioassayed for potency data and both bioassay potency and unit risks are cross-compared to each other to evaluate the comparative potency approach for use with single chemicals (HERL/L104B0701)
In vitro, *in vivo* germ cell multi-test systems	Genetic Toxicity/ Carcinogenesis/ Mutagenesis	The objective is to develop test systems specifically aimed at assessing gene and chromosomal effects in germ cells after exposure to mutagens and carcinogens. Cytogenetic methods are based on sister chromatid exchanges and meiotic crossover exchange. Immunological procedures involve antibody production against sperm enzymes (HERL/L104B0702)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
Short-term bioassay comparative potency methods	Mutagenesis	The objective is to develop comparative potency methods to assess the potential cancer risk from hazardous air pollutants which are complex source emissions, and to develop strategies for assessing the mutagenicity of indoor and outdoor air (HERL/A101C8101)
In vitro and *in vivo* assays to evaluate the effects of mixtures of drinking water contaminants	Target Organ Toxicology	The objective is to develop and validate methods for assessing the effects of mixtures of organic compounds on renal and hepatic toxicity for extrapolation to low doses near ambient levels. The interactions between chemicals will be characterized as additive, synergistic, or antagonistic (HERL/C104D6201)
In vitro, *in vivo* bioassay prescreening of hazardous wastes	Acute Toxicity/ Genotoxicity/ Teratogenesis/ Neurotoxicity/ Immunotoxicity/ Systemic/Organ Toxicity	The objective is to provide a rapid, sensitive, reliable, inexpensive qualitative screening protocol (pre-screen) for use in identifying biologically active RCRA materials (raw wastes, leachates, etc.). The prescreen will combine currently available *in vivo* and *in vitro* test methods in the areas of general toxicology, mutagenesis, carcinogenesis, neurotoxicology, immunotoxicology, reproductive toxicology and teratology (HERL/D109C0106)
In vivo, *in vitro* mutageneticity test battery for human risk estimation	Genetic Toxicity/ Carcinogenesis/ Mutagenesis	The objective is to develop, validate, and implement techniques for determining genetic effects of human exposure to chemical carcinogens and mutagens by means of quantitative correlation of animal and human dose-effect information (HERL/L104B0703)

The contents of this table reflect information available as of September 1986.

TOXICOLOGY METHODS DEVELOPMENT

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In vivo, interspecies significance of toxicology test data	Metabolic Toxicity/ Cardiovascular Toxicity/Endocrine Toxicity	The objective is to gain a better understanding of the interspecies significance of toxicology test data and to assess the effects of hepatic, cardiovascular, and hormonal alterations on the general health of the animal to provide a rational basis for the extrapolation of laboratory-derived toxicological data to the human population (HERL/L104B0704)
In vivo, predictive mathematical extrapolation model	Pulmonary Toxicity	The objectives are to obtain better input data for theoretical respiratory uptake models by developing accurate morphometric data on the pulmonary acinus region in animals and humans and to utilize three-dimensional reconstruction data to study deposition of particles in human and animal lungs (HERL/L104B0705)
In vivo evaluation of significance of neurotoxic response indicators	Neurotoxicity	The objective is to determine the relationship of indicators of neurotoxicity to disease states and/or neurobehavioral dysfunction based on a broad array of neurochemical, anatomical, electrophysiological and behavioral tests (HERL/L104B0706)
In vivo, *in vitro* bioassay	Mutagenesis/ Carcinogenesis	The objective is to develop a comparative potency method for assessing cancer risk from source emissions and to evaluate and quantify the contribution of various source emissions to the mutagenicity and cancer risk of air pollution (HERL/A101C4301)

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In vivo methods to identify cardiovascular effects	Cardiovascular Toxicity	Development and validation of methods to screen potentially toxic agents for both acute and chronic effects on cardiovascular functional parameters. In addition, some "in-depth" methods are being developed to characterize mechanisms of action and to incorporate blood flow parameters into analyses. Ultimate goal of this research is to expand our capabilities to incorporate measurements in unanesthetized, unrestrained animals utilizing radiotelemetry methodology (HERL/L104A0314).
In vivo assay of whole-body metabolism	Systemic Toxicity	Objective is to measure body temperature and metabolic rate in rodents administered toxic agents. These physiologic variables are sensitive and indicators of intoxication (HERL/L104A0314).
In vivo short-term biochemical screen for carcinogenic initiators and promoters	Carcinogenesis	As a short-term *in vivo* test, this screen will complement already existing short-term *in vitro* bacterial and cell culture techniques as well as the expensive life-time rodent bioassays. Several groups of chemical carcinogens, such as chlorinated hydrocarbons, metals, promoters, and hormones are notoriously difficult to detect in short-term *in vitro* tests. The *in vivo* biochemical screen is composed of individual parameters which should respond to these four groups of difficult-to-detect carcinogens (HERL/L104A0314).

The contents of this table reflect information available as of September 1986.

ENVIRONMENTAL PROTECTION AGENCY (Continued)

Methods	Area	Abbreviated Summary (Performing Organization and Project No.)
In vitro bioassays to predict the toxicities of polychlorinated dibenzo-p-dioxins and dibenzofurans	Metabolism	The objective is to provide testing methods to be used as *in vitro* predictors of the *in vivo* toxicity of polychlorinated dibenzo-*p*-dioxins (PCDDs) and dibenzofurans (PCDFs) mixtures. Using their capacity for receptor binding and induction of the enzymes aryl hydrocarbon hydroxylase and ethoxyresorufin *O*-deethylase (AHH/EROD), bioassays for PCDDs and PCDFs will be developed (HERL/D109D5601).
Structure-activity methods for predicting toxicities of dioxin-related compounds	Structure-activity Modeling	The objective is to provide models to further predict the toxicity of untested dioxin-related compounds using causal structure-activity methods which will be applied to preliminary assessment and priority setting activities (HERL/D109D5601).

The contents of this table reflect information available as of September 1986.

CHEMICAL COMPOUNDS CURRENTLY BEING TESTED BY DHHS, DOE, AND EPA FOR TOXICOLOGICAL PROPERTIES

INTRODUCTION TO TABLES AND INDEXES

The tables are organized as in the previous reports. The grouping of tests is that which was provided by the agency to NTP. The names of chemicals are those given by the agencies, and range from generic, trade and trivial names to systematic nomenclature. The Chemical Abstracts Registry (CAS) Numbers have been located for most of the chemicals that have CAS Numbers; they assist the user to locate a chemical regardless of the particular name used by the agencies.

There are three indexes: Chemical Index (by name), CAS Registry Number Index, and the Study Type Index. The first and third indexes which are alphabetical also give the CAS Registry Numbers.

Both the Tables and Indexes are arranged by a chemical sorting program which ignores single letters and numbers in sequencing the names, and the result is a logical sequence of names.

The Study Type Index is divided into the following categories:

1. Biochemical/Cellular/Tissue Effects (includes general biochemistry, pathology, and toxic mechanisms at molecular, cellular and tissue levels)
2. Clinical Toxicology/Epidemiology (human and animal)
3. Carcinogenesis Studies
4. Chronic Toxicity* (includes general toxicology, adverse effects, side effects)
5. Immunologic Toxicity
6. Mutagenesis/Genetic Toxicity
7. Neurologic/Behavioral Toxicity
8. Nutritional Studies
9. Pharmacokinetics/Metabolism (of xenobiotics and their fate in biological systems; includes general pharmacology)
10. Pulmonary Toxicity
11. Reproductive/Developmental Toxicity
12. Subchronic Toxicity* (includes general toxicology, adverse effects, side effects)
13. Systemic/Organ Toxicity and Physiologic Systems (except Reproductive/Pulmonary/Immunologic Systems)

We recommend that the user enter these Tables by checking both the Chemical Name and CAS Registry Number Indexes, since agencies often use different names to describe the same chemical. If a desired chemical is not located under a given CAS Registry Number, one should check with CHEMLINE or a similar system to be sure that a new CAS Registry Number has not been assigned to that chemical.

If the user identifies any errors or inaccurate entries, he is requested to call them to the attention of Dr. Larry Hart, National Toxicology Program, P.O. Box 12233, Research Triangle Park, NC 27709, so that they may be corrected in the next edition of this compilation.

*By definition, "chronic studies" are greater than six months in duration while "subchronic studies" are six months or less in duration.

TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
STRUCTURE ACTIVITY, BASIC STUDIES - RATS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETALDOXIME	107-29-9	CARCINOGENESIS	A	FCRC/N01-CP-75380
AZOXYETHANE		CARCINOGENESIS	A	NCI-FCRF
AZOXYMETHANE		CARCINOGENESIS	A	NCI-FCRF
DIETHYLTRIAZENE		CARCINOGENESIS	A	NCI-FCRF
NITROSO-ALLYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSO-N-AMYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSOBIS-(2-HYDROXYPROPYL)-AMINE		CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSO-BIS-(2-OXOPROPYL)-AMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSO-BIS-(2-OXOPROPYL)AMINE-D4		CARCINOGENESIS	B	NCI-FCRF
NITROSO-BIS-(2-OXOPROPYL)-AMINE	60599-38-4	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSO-N-BUTYLUREA		CARCINOGENESIS	A	NCI-FCRF
1-NITROSO-1-(2-CHLOROETHYL)-3-(2-HYDROXYPROPYL)-UREA		CARCINOGENESIS	B	NCI-FCRF
NITROSODIETHANOLAMINE	1116-54-7	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSODIETHANOLAMINE		CARCINOGENESIS	A	NCI-FCRF
NITROSODIETHYLAMINE		CARCINOGENESIS	A	NCI-FCRF
NITROSO-DIETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSODIMETHYLAMINE	62-75-9	CARCINOGENESIS	A	NCI-FCRF
NITROSODIMETHYLAMINE	62-75-9	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSO-DIMETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
1-NITROSO-1-ETHYL-3-(2-HYDROXYETHYL-UREA)		CARCINOGENESIS	A	NCI-FCRF
1-NITROSO-1-ETHYL-3-METHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSOETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSO-2-FLUOROETHYLUREA		CARCINOGENESIS	B	NCI-FCRF
1-NITROSO-1-(2-HYDROXYETHYL)-3-ETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSOHYDROXYETHYLUREA	13743-07-2	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSO-1-ETHYL-3-(2-OXOPROPYL) UREA		CARCINOGENESIS	C	NCI-FCRF
NITROSO-N-HEXYLUREA		CARCINOGENESIS	A	NCI-FCRF
1-NITROSO-1-(2-HYDROXYETHYL)-3-(2-CHLOROETHYL)UREA		CARCINOGENESIS	B	NCI-FCRF
NITROSO-2-HYDROXY-MORPHOLINE		CARCINOGENESIS	B	NCI-FCRF

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
STRUCTURE ACTIVITY, BASIC STUDIES - RATS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
1-NITROSO-1-(2-HYDROXYPROPYL)-3-(2-CHLOROETHYL)UREA		CARCINOGENESIS	B	NCI-FCRF
NITROSO-(2-HYDROXYPROPYL) (2-OXOPROPYL)-AMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOHYDROXYPROPYLOXOPROPYLAMINE	61499-28-3	CARCINOGENESIS	A	FCRF/N01-CP-75380
NITROSO-3-HYDROXYPROPYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSO-2-METHOXETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSO-N-METHYLANILINE	614-00-6	CARCINOGENESIS	A	NCI-FCRF
NITROSOMETHYL-3-CARBOXYPROPYLAMINE		CARCINOGENESIS	A	FCRF/N01-CP-75380
NITROSOMETHYLCYCLOHEXYLAMINE	5432-28-0	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSOMETHYLETHYLAMINE	10595-95-6	CARCINOGENESIS	A	FCRC/N01-CP-75380
1-NITROSO-1-METHYL-3-ETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSOMETHYL-2-HYDROXYPROPYLAMINE		CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSOMETHYL-N-OCTYLAMINE	34423-54-6	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSOMETHYL-2-OXOPROPYLAMINE		CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSOMETHYLUREA	684-93-5	CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSOMORPHOLINE		CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSO-1-(2-OXOPROPYL)-3-ETHYLUREA		CARCINOGENESIS	C	NCI-FCRF
NITROSO-2-OXOPROPYLUREA		CARCINOGENESIS	B	NCI-FCRF
NITROSO-2-PHENYLETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSOTHIALDINE		CARCINOGENESIS	A	FCRC/N01-CP-75380
NITROSOTHIAZOLIDINE		CARCINOGENESIS	A	NCI-FCRF

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
STRUCTURE ACTIVITY, FEEDING STUDIES WITH NITRITE

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
HYDROCHLOROTHIAZIDE	58-93-5	CARCINOGENESIS	A	FCRC/N01-CP-75380
HYDROCHLOROTHIAZIDE WITH NITRITE	58-93-5 4797-65-0	CARCINOGENESIS	A	FCRC/N01-CP-75380
METHAPYRILENE		INITIATION/PROMOTION WITH PHENOBARBITAL OR PARTIAL HEPATECTOMY	C	NCI-FCRF

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
STRUCTURE ACTIVITY, IN VIVO TRANSNITROSATION

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
SODIUM THIOCYANATE	540-72-7	CARCINOGENESIS	A	FCRC/N01-CP-75380
SODIUM THIOCYANATE WITH SODIUM NITRITE	540-72-7 7632-00-0	CARCINOGENESIS	A	NCI-FCRF

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
IN VITRO TESTING

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
AZOCYTOSINEARABINOSIDE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOICATES/NO1-CP-41004
BARIUM LITHOL	1103-38-4	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
BUTANAL OXIME	110-69-0	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
2-BUTANONE, OXIME	96-29-7	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
CHLORSULFAQUINOXALINE	98-56-6	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
C.I. FOOD BLACK 1	2519-30-4	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
CYCLOHEXANONE, OXIME	100-64-1	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
DIDEOXYCYTIDINE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
DIPROPYLENE GYCOL	25265-71-8	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
DODECENYLSUCCINIC ANHYDRIDE	25377-73-5	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
ERGOTAMINE TARTRATE	379-79-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
ETHYLENE GLYCOL DIACRYLATE	2274-11-5	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
ETHYLENE GLYCOL DIMETHACRYLATE	97-90-5	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
9-FLUORENONE	486-25-9	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
FUMARYLACETONE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
HISTIDINOL		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
2-(HYDROXYIMINO)-N-PHENYL-ACETAMIDE OXIME	1769-41-1	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
ISOAMYL NITRITE	110-46-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
ISOBUTYL NITRITE	542-56-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
KAEMPFEROL	520-18-3	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
METHYL ISOCYANATE	624-83-9	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
2-METHYL-2-(METHYLTHIO)-PROPIONALDOXIME	1646-75-9	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
5-(4-NITROPHENYL)PENTA-2,4-DIENAL		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
PODOPHYLLOTOXIN	518-28-5	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
PRIMACLONE	125-33-7	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
N-PROPYL NITRITE	543-67-9	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
SESAMOL	533-31-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
SODIUM LAUROYLISETHIONATE	7381-01-3	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
SODIUM SELENITE	10102-18-8	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
SUCCINYLACETONE	51568-18-4	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
TRIMETHYLOLPROPANE TRIACRYLATE	15625-89-5	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004

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0156

TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
IN VITRO TESTING

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
TRIMETHYLOLPROPANE TRIMETHACRYLATE	3290-92-4	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
P-VINYL GUAIACOL	7786-61-0	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004
ZIRCONIUM OXYCHLORIDE	7699-43-6	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/NO1-CP-41004

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
BACTERIAL MUTAGENESIS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
AZOCYTOSINEARABINOSIDE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
BARIUM LITHOL	1103-38-4	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
CHLORSULFAQUINOXALINE	98-56-6	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
C.I. FOOD BLACK 1	2519-30-4	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
DIDEOXYADENOSINE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
DIDEOXYCYTIDINE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
DIPROPYLENE GLYCOL	25265-71-8	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
ERGOTAMINE TARTRATE	379-79-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
ETHYLENE GLYCOL DIACRYLATE	2274-11-5	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
ETHYLENE GLYCOL DIMETHACRYLATE	97-90-5	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
9-FLUORENONE	486-25-9	MUTAGENESIS/GENETIC TOXICITY	B	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
2-(HYDROXYIMINO)-N-PHENYL-ACETAMIDE OXIME	1769-41-1	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
4-IPOMEANOL		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
KAEMPFEROL	520-18-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
METHYL ISOCYANATE	624-83-9	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
2-METHYL-2-(METHYLTHIO)-PROPIONALDOXIME	1646-75-9	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
5-(4-NITROPHENYL)PENTA-2,4-DIENAL		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
PHYLLANTHOSIDE		MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
PODOPHYLLOTOXIN	518-28-5	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
PRIMACLONE	125-33-7	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
SESAMOL	533-31-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
SODIUM LAUROYLISETHIONATE	7381-01-3	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
TRIMETHYLOLPROPANE TRIACRYLATE	15625-89-5	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
TRIMETHYLOLPROPANE TRIMETHACRYLATE	3290-92-4	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030
P-VINYL GUAIACOL	7786-61-0	MUTAGENESIS/GENETIC TOXICITY	A	MICROBIOLOGICAL ASSOCIATES/N01-CP-41030

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER ETIOLOGY
STRUCTURE ACTIVITY, SYRIAN HAMSTERS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NITROSO-DIETHYLUREA		CARCINOGENESIS	B	NCI-FCRF
NITROSO-DIMETHYLUREA		CARCINOGENESIS	B	NCI-FCRF
NITROSOHYDROXYETHYLUREA	13743-07-2	CARCINOGENESIS	A	NCI-FCRF
NITROSOMETHYL-N-AMYLAMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYL-N-BUTYLAMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYL-CYCLOHEXYLAMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYL-N-HEPTYLAMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYL-N-HEXYLAMINE	28538-70-7	CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYL-N-OCTYLAMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYL-N-PROPYLAMINE		CARCINOGENESIS	B	NCI-FCRF
NITROSOMETHYLUREA		CARCINOGENESIS	A	NCI-FCRF
NITROSO-1-(2-OXOPROPYL)-3-ETHYLUREA		CARCINOGENESIS	C	NCI-FCRF
NITROSO-2-OXOPROPYLUREA		CARCINOGENESIS	B	NCI-FCRF
NITROSO-2-PHENYLETHYLUREA		CARCINOGENESIS	B	NCI-FCRF

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TOXICOLOGY TESTING

NATIONAL CANCER INSTITUTE
DIVISION OF CANCER TREATMENT
TEST ON POTENTIAL CANCER CHEMOTHERAPEUTIC AGENTS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
BENZENESULFONAMIDE, 4-AMINO-N [5-CHLORO-2-QUINOXALINYL)]- (NSC-339004)		SUBCHRONIC TOXICITY	A	DCT SUBCONTRACTOR
L-BUTHIONINE SULFOXIMINE		SUBCHRONIC TOXICITY	A	DCT SUBCONTRACTOR
2',3'-DIDEOXYADENOSINE (NSC-98700)	4097-22-7	SUBCHRONIC TOXICITY	A	DCT SUBCONTRACTOR
2',3'-DIDEOXYCYTIDINE (NSC-606170)	7481-89-2	SUBCHRONIC TOXICITY	A	DCT SUBCONTRACTOR
1,5,2,4-DIOXADITHIEPANE, 2,2,4,4-TETRAOXIDE		SUBCHRONIC TOXICITY	C	DCT SUBCONTRACTOR
4-IPOMEANOL (NSC-349438)	32954-58-8	SUBCHRONIC TOXICITY	A	DCT SUBCONTRACTOR
ISOINDOLO[1,2-B]QUINAZOLIN-12-(10H)-ONE, 8-AMINO- (NSC-320846D)		SUBCHRONIC TOXICITY	C	DCT SUBCONTRACTOR
PHYLLANTHROSIDE	63166-73-4	SUBCHRONIC TOXICITY	A	DCT SUBCONTRACTOR
PLATINUM, TETRACHLORO (1,2,-CYCLO-HEXANEDIAMINE-N,N')-, [OC-6-22-(TRANS)]-, (NSC-363812)		SUBCHRONIC TOXICITY	C	UPJOHN
PYRAZINE DIAZOHYDROXIDE (NSC-361456)		SUBCHRONIC TOXICITY	C	DCT SUBCONTRACTOR
RHIZOXIN (NSC-332598)		SUBCHRONIC TOXICITY	C	DCT SUBCONTRACTOR
SULFAMIC ACID, 1,7-HEPTANEDYL ESTER (NSC-329680)		SUBCHRONIC TOXICITY	C	DCT SUBCONTRACTOR

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACRYLONITRILE	107-13-1	CARCINOGENESIS	B	NEW YORK UNIV./R01 ES 3043
AROMATIC HYDROCARBONS		MUTAGENESIS/GENETIC TOXICITY	B	UNIV. OF LEIDEN/5 R01 ES 1027
AROMATIC HYDROCARBONS		MUTAGENESIS/GENETIC TOXICITY	B	UNIV. OF NORTH CAROLINA/R01-ES-3433
AROMATIC HYDROCARBONS		MUTAGENESIS/GENETIC TOXICITY	B	IIT RES. INST./R01 ES 3295
BENZYL ACETATE	140-11-4	SYSTEMIC/ORGAN TOXICITY	B	DARTMOUTH COLLEGE/R01 ES 3283
CHEMICAL PROMUTAGENS		MUTAGENESIS/GENETIC TOXICITY	B	HOPE COLL./1 R01 ES 2384
CORN OIL	8001-30-7	CARCINOGENESIS	B	UNIV. OF MISSOURI AT COLUMBIA/ U01 ES 3685
CORN OIL	8001-30-7	CARCINOGENESIS	B	DARTMOUTH COLLEGE/U01 ES 3687
CORN OIL	8001-30-7	CARCINOGENESIS	B	NORTHWESTERN UNIV./U01 ES 3690
HALO ALKYL PHOSPHATES		MUTAGENESIS/GENETIC TOXICITY	B	UNIVERSITY OF WASHINGTON, SEATTLE R01 ES 2728
LIPID EPOXIDES		MUTAGENESIS/GENETIC TOXICITY	B	UNIV. OF SOUTHERN CALIFORNIA/R01-ES-3466
MYCOTOXINS		IMMUNOLOGIC TOXICITY	B	MICHIGAN STATE UNIV./R01 ES 3358
QUINOLINES		CARCINOGENESIS	B	AMER. HEALTH FOUNDATION/R01 ES 2338
QUINOLINES		MUTAGENESIS/GENETIC TOXICITY	B	STATE UNIV. OF NEW YORK AT BUFFALO/ R01-ES-3218
VOLATILE SOLVENTS		SYSTEMIC/ORGAN TOXICITY	B	MICHAEL REESE HOSP. MED. CTR./CHICAGO/ R01-ES-3268

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
INTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
*ACETONE	67-64-1	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	ATSDR/NTP IAG-222-Y03-ES-30110
*ACRYLIC ACID ESTERS		SYSTEMIC/ORGAN TOXICITY	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21059 AND 21060
*ARSINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21086 AND Z01-ES-21090
*BENZIDINE	92-87-3	IMMUNOLOGIC TOXICITY	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-30106
*BROMOFORM	75-25-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	ATSDR/NTP IAG-222-Y03-ES-30110
*2-BUTOXYETHANOL	111-76-2	PHARMACOKINETICS/METABOLISM	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21033 AND Z01-ES-21038
*2-BUTOXYETHANOL	111-76-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21085 AND Z01-ES-21086
*CALCIUM CHANNEL BLOCKERS		SYSTEMIC/ORGAN TOXICITY PHYSIOLOGIC SYSTEMS	C	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21081 AND Z01-ES-21085
*CITRAL	5392-40-5	PHARMACOKINETICS/METABOLISM	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21033
*CYCLIC NITROSAMINES		MUTAGENESIS/GENETIC TOXICITY	B	CELLULAR AND GENETIC TOXICOLOGY BRANCH/ Z01-ES-60102
*1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	SYSTEMIC TOXICOLOGY BRANCH/Z01 ES-21009
		SYSTEMIC/ORGAN TOXICITY	B	CARCINOGENESIS AND TOXICOL. EVAL. BRANCH Z01-ES-30100
DICHLORODIPHENYLETHYLENE	72-55-9	CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	EPIDEMIOLOGY BRANCH/Z01-ES-43002
*DIETHYLPHTHALATE	84-66-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	ATSDR/NTP IAG-222-Y03-ES-30110
*DIMETHYL HYDROGEN PHOSPHITE	868-85-9	PHARMACOKINETICS/METABOLISM BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21087
*DIMETHYLPHTHALATE	131-11-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	ATSDR/NTP IAG-222-Y03-ES-30110
*DI-PENTYLPHTHALATE	131-18-0	PHARMACOKINETICS/METABOLISM	B	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21038
*GALLIUM ARSENIDE	1303-00-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21090
*GLYCOL ETHERS		IMMUNOLOGIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21009
*HALOGENATED DIBENZOFURANS		PHARMACOKINETICS/METABOLISM	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21003
*HEXACHLORO-1,3-BUTADIENE	87-68-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	ATSDR/NTP IAG-222-Y03-ES-30110
*HEXANE	110-54-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	ATSDR/NTP IAG-222-Y03-ES-30110
*MERCURIC CHLORIDE	7487-94-7	CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY	B	CARCINOGENESIS AND TOXICOLOGY EVAL. BR.

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0162

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
INTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
*METHYL ISOCYANATE	624-83-9	CHRONIC/SUBCHRONIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		IMMUNOLOGIC TOXICITY		
		MUTAGENESIS/GENETIC TOXICITY		
		PULMONARY TOXICITY	A	CARCINOGENESIS AND TOXICOLOGY EVALUATION BRANCH/Z01-ES-21067 AND SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-30106
*NICKEL SULFATE		IMMUNOLOGIC TOXICITY	B	CARCINOGENESIS AND TOXICOLOGY EVALUATION BRANCH/Z01-ES-21076
PCB'S		CLINICAL TOXICOLOGY/EPIDEMIOLOGY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	EPIDEMIOLOGY BRANCH/Z01-ES-43002
*PHENANTHRENEIMINES		MUTAGENESIS/GENETIC TOXICITY	A	CELLULAR AND GENETIC TOXICOLOGY BRANCH Z01-ES-60102
*RESORCINOL	108-46-3	PHARMACOKINETICS/METABOLISM	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21038
*SODIUM BISULFITE		MUTAGENESIS/GENETIC TOXICITY	B	CELLULAR AND GENETIC TOXICOLOGY BRANCH/ Z01-ES-60102
*1,2,4,5-TETRACHLOROBENZENE	95-94-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	ATSDR/NTP IAG-222-Y03-ES-30110
*2,3,7,8-TETRACHLORO-DIBENZO-P-DIOXIN	1746-01-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21070
		IMMUNOLOGIC TOXICITY	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-30106
*TETRAHYDROFURAN	109-99-9	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	ATSDR/NTP IAG-222-Y03-ES-30110
*4,4'-THIOBIS-(6-T-BUTYL M-CRESOL)	96-69-5	PHARMACOKINETICS/METABOLISM	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21033
*TITANOCENE DICHLORIDE	1271-19-8	IMMUNOLOGIC TOXICITY	B	CARCINOGENESIS AND TOXICOLOGY EVALUATION BRANCH/Z01-ES-21076
*1,1,1-TRICHLOROETHANE	71-55-6	PHARMACOKINETICS/METABOLISM		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	ATSDR/NTP IAG-222-Y03-ES-30110
*TRICHLORO-ETHYLENE	79-01-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	ATSDR/NTP IAG-222-Y03-ES-30110
*TRIORTHOCRESYLPHOSPHATE	78-30-8	PHARMACOKINETICS/METABOLISM	A	SYSTEMIC TOXICOLOGY BRANCH/Z01-ES-21057

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
*AMSONIC ACID		PHARMACOKINETICS/METABOLISM	A	SOUTHERN RESEARCH INST./N01-ES-1-5008
*BENZENE	71-43-2	PHARMACOKINETICS/METABOLISM	B	LOVELACE INHALATION TOXICITY RESEARCH INST./22Y01-ES-20092
* -BROMO- -NITROSTYRENE	7166-19-0	PHARMACOKINETICS/METABOLISM	A	RESEARCH TRIANGLE INST./N01-ES-1-5007
*1,3-BUTADIENE	106-99-0	PHARMACOKINETICS/METABOLISM	A	LOVELACE INHALATION TOXICITY RESEARCH INST./22Y01-ES-20092
*N-(3-CHLOROALLYL)-HEXAMINIUM CHLORIDE	4080-31-3	PHARMACOKINETICS/METABOLISM	A	SOUTHERN RESEARCH INST./N01-ES-1-5008
*1-CHLORO-2-PROPANOL	127-00-4	PHARMACOKINETICS/METABOLSIM	B	LOVELACE INHALATION TOXICITY RESEARCH INST./22Y01-ES-20092
*D AND C YELLOW #11	8003-22-3	PHARMACOKINETICS/METABOLISM	A	SOUTHERN RESEARCH INST./N01-ES-1-5008
*1,2-DICHLOROBENZENE	95-50-1	PHARMACOKINETICS/METABOLISM	A	UNIV. OF ARIZONA/N01-ES-3-5031
*DIETHYL PHTHALATE	84-66-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	RESEARCH TRIANGLE INST./N01-ES-5-5080
*4,5-DIHYDROXY-1,3-BIS(HYDROXY METHYL)-2-IMIDAZOLIDINONE		PHARMACOKINETICS/METABOLISM	A	RESEARCH TRIANGLE INST./N01-ES-1-5007
*DIMETHYL PHTHALATE	131-11-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	RESEARCH TRIANGLE INST./N01-ES-5-5080
*ETHYLENE GLYCOL DIETHYL ETHER	629-14-1	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	RESEARCH TRIANGLE INST./N01-ES-5-5080
*2-ETHYL HEXANOL	104-76-7	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	RESEARCH TRIANGLE INST./N01-ES-5-5080
*GALLIUM ARSENIDE	1303-00-0	IMMUNOLOGIC TOXICITY	B	MEDICAL COLLEGE OF VIRGINIA/N01-ES-5-5094
*GLYCOL ETHER ACETATES		PHARMACOKINETICS/METABOLISM	B	RESEARCH TRIANGLE INST./N01-ES-1-5007
*GLYPHOSATE	1071-83-6	PHARMACOKINETICS/METABOLISM	A	UNIV. OF ARIZONA/N01-ES-3-5031
*HEXACHLORO-BUTADIENE	87-68-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	RESEARCH TRIANGLE INST./N01-ES-5-5080
*N-HEXANE	110-54-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	BATTELLE NORTHWEST LABS/1Y01-ES-4-0131
*2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	PHARMACOKINETICS/METABOLISM	A	SOUTHERN RESEARCH INST./N01-ES-1-5008
*ISOPRENE	78-79-5	PHARMACOKINETICS/METABOLISM	B	LOVELACE INHALATION TOXICITY RESEARCH INST./22Y01-ES-2-0092
*METHYLENE-BIS-THIOCYANATE	6317-18-6	PHARMACOKINETICS/METABOLISM	B	UNIV. OF ARIZONA/N01-ES-3-5031
*MONO-ETHYL-HEXYL PHTHALATE	4376-20-9	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	RESEARCH TRIANGLE INST./N01-ES-5-5080
*O-NITROANISOLE	91-23-6	PHARMACOKINETICS/METABOLISM	A	UNIV. OF ARIZONA/N01-ES-3-5031
*NITROTOLUENES		IMMUNOLOGIC TOXICITY	B	MEDICAL COLLEGE OF VIRGINIA/N01-ES-5-5094
*N-PHENYL-2-NAPHTHYLAMINE	135-88-6	PHARMACOKINETICS/METABOLISM	A	SOUTHERN RESEARCH INST./N01-ES-1-5008
POLYCHLORINATED BIPHENYLS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	EAST CAROLINA UNIV.,/N01-ES-0-0005
POLYCHLORINATED BIPHENYLS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	DURHAM WOMEN"S CLINIC/N01-ES-1-5006

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
POLYCHLORINATED BIPHENYLS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	WAKE AREA HEALTH EDUCATION CENTER NO1-ES-0-0006
*POLYCHLORINATED BIPHENYLS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	NATL. TAIWAN UNIVERSITY HOSPITAL, TAIPEI, TAIWAN
*1,2,4,5-TETRACHLOROBENZENE	95-94-3	PHARMACOKINETICS/METABOLISM	B	UNIV. OF ARIZONA/NO1-ES-3-5031
*TETRAHYDROFURAN	109-99-9	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	BATTELLE NORTHWEST LABS/1Y01-ES-4-0131
*THEOPHYLLINE	58-55-9	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	RESEARCH TRIANGLE INST./NO1-ES-5-5080
*1,1,1-TRICHLOROETHANE	71-55-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	RESEARCH TRIANGLE INST./NO1-ES-5-5080
*1,1,1-TRICHLOROETHANE	71-55-6	PHARMACOKINETICS/METABOLISM	B	RESEARCH TRIANGLE INST./NO1-ES-1-5007
*4-VINYL CYCLOHEXENE	100-40-3	PHARMACOKINETICS/METABOLISM	A	UNIV. OF ARIZONA/NO1-ES-3-5031
*VINYLIDENE FLUORIDE	75-38-7	PHARMACOKINETICS/METABOLISM	C	LOVELACE INHALATION TOXICITY RESEARCH INST./22Y01-ES-20092

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS
IN VITRO MICROBIAL*

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ACENAPHTHENE	83-32-9	MUTAGENESIS/GENETIC TOXICITY	B	
ACETIC ACID	64-19-7	MUTAGENESIS/GENETIC TOXICITY	B	
ACETOHEXAMIDE	968-81-0	MUTAGENESIS/GENETIC TOXICITY	B	
2-ACETYLAMINO-4-METHYLPHENOL	6375-17-3	MUTAGENESIS/GENETIC TOXICITY	A	
4-ACETYL PYRIDINE	1122-54-9	MUTAGENESIS/GENETIC TOXICITY	C	ALL IN VITRO MICROBIAL TESTS ARE TO BE PERFORMED AT ONE OR BOTH OF THE FOLLOWING ORGANIZATIONS: MICROBIOLOGICAL ASSOC./N01-ES-35021 SRI INTERNATIONAL/N01-ES-35022
N-ACETYL-P-TOLUIDINE	103-89-9	MUTAGENESIS/GENETIC TOXICITY	A	
AGARITINE	2757-90-6	MUTAGENESIS/GENETIC TOXICITY	A	
ALDRIN	309-00-2	MUTAGENESIS/GENETIC TOXICITY	C	
AMILORIDE HCL	2016-88-8	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINOBENZENESULFONIC ACID	88-21-1	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-4-CHLORO-6-NITROPHENOL	6358-08-3	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-4-CHLOROPHENOL	95-85-2	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-4,6-DICHLOROPHENOL	527-62-8	MUTAGENESIS/GENETIC TOXICITY	A	
3-AMINO-4-METHYLPHENOL	2836-00-2	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-3-NITRO-4-METHYLPHENOL	6265-05-0	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-5-NITRO-4-METHYLPHENOL	6265-06-1	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-6-NITRO-1-PHENOL-4-SULFONIC ACID	96-93-5	MUTAGENESIS/GENETIC TOXICITY	A	
3-AMINO-5-SULFOSALICYLIC ACID	6201-86-1	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-4-THIAZOLEACETIC ACID	29676-71-9	MUTAGENESIS/GENETIC TOXICITY	A	
2-AMINO-3,4,6-TRICHLOROPHENOL	6358-15-2	MUTAGENESIS/GENETIC TOXICITY	A	
AMPHOTERICIN B	1397-89-3	MUTAGENESIS/GENETIC TOXICITY	B	
ANTIMONY POTASSIUM TARTRATE	28300-74-5	MUTAGENESIS/GENETIC TOXICITY	C	
5-AZACYTIDINE	320-67-2	MUTAGENESIS/GENETIC TOXICITY	A	
AZATHIOPRINE	446-86-6	MUTAGENESIS/GENETIC TOXICITY	A	
AZOXYMETHANE	25843-45-2	MUTAGENESIS/GENETIC TOXICITY	A	
BARIUM CHLORIDE DIHYDRATE	10326-27-9	MUTAGENESIS/GENETIC TOXICITY	A	
BENZO(B)FLUORANTHENE	205-99-2	MUTAGENESIS/GENETIC TOXICITY	C	
BENZO(K)FLUORANTHENE	207-08-9	MUTAGENESIS/GENETIC TOXICITY	C	
1,2,3-BENZOTRIAZOLE	95-14-7	MUTAGENESIS/GENETIC TOXICITY	A	
BENZOYL CHLORIDE	98-88-4	MUTAGENESIS/GENETIC TOXICITY	C	
BENZYL SULFIDE	538-74-9	MUTAGENESIS/GENETIC TOXICITY	C	
BERYLLIUM SULFATE TETRAHYDRATE	7787-56-6	MUTAGENESIS/GENETIC TOXICITY	A	
(4,4'-BITHIAZOLE)-2,2'-DIAMINE	58139-59-6	MUTAGENESIS/GENETIC TOXICITY	C	
BETA-BROMO-BETA-NITROSTYRENE	7166-19-0	MUTAGENESIS/GENETIC TOXICITY	B	
BROMOPICRIN	464-10-8	MUTAGENESIS/GENETIC TOXICITY	A	
1,3-BUTADIENE	106-99-0	MUTAGENESIS/GENETIC TOXICITY	B	
N-BUTANE	106-97-8	MUTAGENESIS/GENETIC TOXICITY	C	

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

CONTRACTS

IN VITRO MICROBIAL*

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4-BUTOXYBENZYL-4-ETHYLANILINE	29743-15-5	MUTAGENESIS/GENETIC TOXICITY	B	
DI-N-BUTYL ETHER	142-96-1	MUTAGENESIS/GENETIC TOXICITY	C	
T-BUTYLHYDROQUINONE	1948-33-0	MUTAGENESIS/GENETIC TOXICITY	C	
BUTYRIC ACID	107-92-6	MUTAGENESIS/GENETIC TOXICITY	A	
BUTYRYL CHLORIDE	141-75-3	MUTAGENESIS/GENETIC TOXICITY	B	
CARBARSONE	121-59-5	MUTAGENESIS/GENETIC TOXICITY	A	
CARMINIC ACID	1260-17-9	MUTAGENESIS/GENETIC TOXICITY	A	
4-(CHLOROACETYL)ACETANILIDE	140-49-8	MUTAGENESIS/GENETIC TOXICITY	A	
N-(3-CHLOROALLYL)HEXAMINIUM CHLORIDE	4080-31-3	MUTAGENESIS/GENETIC TOXICITY	A	
2-CHLOROBENZALDEHYDE	89-98-5	MUTAGENESIS/GENETIC TOXICITY	A	
4-CHLOROBENZALDEHYDE	104-88-1	MUTAGENESIS/GENETIC TOXICITY	B	
M-CHLOROBENZOIC ACID	535-80-8	MUTAGENESIS/GENETIC TOXICITY	A	
O-CHLOROBENZOIC ACID	118-91-2	MUTAGENESIS/GENETIC TOXICITY	A	
P-CHLOROBENZOIC ACID	74-11-3	MUTAGENESIS/GENETIC TOXICITY	A	
4-CHLORO-M-CRESOL	59-50-7	MUTAGENESIS/GENETIC TOXICITY	A	
4-CHLORO-O-CRESOL	1570-64-5	MUTAGENESIS/GENETIC TOXICITY	B	
1-CHLORONAPTHALENE	90-13-1	MUTAGENESIS/GENETIC TOXICITY	B	
2-CHLORONAPTHALENE	91-58-7	MUTAGENESIS/GENETIC TOXICITY	C	
2-CHLORO-2-NITROPROPANE	594-71-8	MUTAGENESIS/GENETIC TOXICITY	A	
2-CHLORO-1-PROPANOL	78-89-7	MUTAGENESIS/GENETIC TOXICITY	D	
CHLOROTHIOFORMIC ACID	EMTDP-49	MUTAGENESIS/GENETIC TOXICITY	C	
P-CHLOROTOLUENE	106-43-4	MUTAGENESIS/GENETIC TOXICITY	A	
C.I. DIRECT BLACK 114	61703-05-7	MUTAGENESIS/GENETIC TOXICITY	A	
C.I. DIRECT ORANGE 6	6637-88-3	MUTAGENESIS/GENETIC TOXICITY	A	
C.I. PIGMENT RED 2	6041-94-7	MUTAGENESIS/GENETIC TOXICITY	A	
C.I. PIGMENT RED 81	12224-98-5	MUTAGENESIS/GENETIC TOXICITY	B	
CLONITRALID	1420-04-8	MUTAGENESIS/GENETIC TOXICITY	C	
COBALT SULFATE HEPTAHYDRATE	10026-24-1	MUTAGENESIS/GENETIC TOXICITY	C	
CREOSOTE	8021-39-4	MUTAGENESIS/GENETIC TOXICITY	C	
P-CUMYL PHENYL GLYCIDYL ETHER	61578-04-9	MUTAGENESIS/GENETIC TOXICITY	C	
CYCLOPENTAPHENANTHRENE	203-64-5	MUTAGENESIS/GENETIC TOXICITY	C	
CYCLOSPORIN A	59865-13-3	MUTAGENESIS/GENETIC TOXICITY	C	
CYTARABINE	147-94-4	MUTAGENESIS/GENETIC TOXICITY	D	
DDD	6088-51-3	MUTAGENESIS/GENETIC TOXICITY	C	
D AND C YELLOW NO. 11	8003-22-3	MUTAGENESIS/GENETIC TOXICITY	A	
DECANE	124-18-5	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-DIAMINODIPHENYLMETHANE	1208-52-2	MUTAGENESIS/GENETIC TOXICITY	C	
DIAZEPAM	439-14-5	MUTAGENESIS/GENETIC TOXICITY	C	

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1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-DICHLOROANILINE	554-00-7	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-DICHLOROBENZALDEHYDE	874-42-0	MUTAGENESIS/GENETIC TOXICITY	C	
2,6-DICHLOROBENZALDEHYDE	83-38-5	MUTAGENESIS/GENETIC TOXICITY	C	
3,4-DICHLOROBENZALDEHYDE	6287-38-3	MUTAGENESIS/GENETIC TOXICITY	C	
DICHLOROBENZOIC ACID	35915-19-6	MUTAGENESIS/GENETIC TOXICITY	C	
2,2'-DICHLOROBIPHENYL	13029-08-8	MUTAGENESIS/GENETIC TOXICITY	C	
CIS-DICHLORODIAMINE PLATINUM	15663-29-1	MUTAGENESIS/GENETIC TOXICITY	C	
1,1-DICHLOROETHANE	75-34-3	MUTAGENESIS/GENETIC TOXICITY	B	
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	MUTAGENESIS/GENETIC TOXICITY	C	
ALPHA,ALPHA-DICHLOROTOLUENE	611-19-8	MUTAGENESIS/GENETIC TOXICITY	C	
DIETHYLDICHLOROSILANE	1719-53-5	MUTAGENESIS/GENETIC TOXICITY	A	
DIETHYLENE GLYCOL MONOBUTYL ETHER	112-34-5	MUTAGENESIS/GENETIC TOXICITY	C	
N,N-DIETHYL-4-((5-NITRO-2-THIAZOLYL)AZO) BENZENAMINE	54289-46-2	MUTAGENESIS/GENETIC TOXICITY	B	
DIGITONIN	11024-24-1	MUTAGENESIS/GENETIC TOXICITY	C	
2,2-DIMETHYLBUTANE	75-83-2	MUTAGENESIS/GENETIC TOXICITY	C	
2,3-DIMETHYLBUTANE	79-29-8	MUTAGENESIS/GENETIC TOXICITY	C	
DIMETHYLDITALLOW AMMONIUM CHLORIDE	68783-78-8	MUTAGENESIS/GENETIC TOXICITY	B	
2,5-DIMETHYLFURAN	625-86-5	MUTAGENESIS/GENETIC TOXICITY	C	
DIMETHYLNAPHTHALENE	28804-88-8	MUTAGENESIS/GENETIC TOXICITY	B	
1,6-DIMETHYLNAPHTHALENE	575-43-9	MUTAGENESIS/GENETIC TOXICITY	B	
1,3-DIMETHYL-2-NITROBENZENE	81-20-9	MUTAGENESIS/GENETIC TOXICITY	A	
N,N-DIMETHYL-N-OCTADECYL-BENZENEMETHANAMINIUM CHLORIDE	122-19-0	MUTAGENESIS/GENETIC TOXICITY	B	
2,3-DIMETHYL-1-PENTANOL	10143-23-4	MUTAGENESIS/GENETIC TOXICITY	C	
DIMETHYL PHENOL	1300-71-6	MUTAGENESIS/GENETIC TOXICITY	C	
DIMETHYLSUCCINATE	106-65-0	MUTAGENESIS/GENETIC TOXICITY	C	
DIMETHYL SULFOXIDE	67-68-5	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-DINITROANILINE	97-02-9	MUTAGENESIS/GENETIC TOXICITY	A	
1,5-DINITRONAPHTHALENE	605-71-0	MUTAGENESIS/GENETIC TOXICITY	A	
DINITROPYRENE MIXTURE	EMTDP-35	MUTAGENESIS/GENETIC TOXICITY	C	
TERT-DODECYL MERCAPTAN	25103-58-6	MUTAGENESIS/GENETIC TOXICITY	C	
ECONAZOLE	27220-47-9	MUTAGENESIS/GENETIC TOXICITY	C	
EPINEPHRINE	51-43-4	MUTAGENESIS/GENETIC TOXICITY	A	

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2,3-EPOXYBUTANE	3266-23-7	MUTAGENESIS/GENETIC TOXICITY	B	
2,3-EPOXY-2,3-DIMETHYLBUTANE	5076-20-0	MUTAGENESIS/GENETIC TOXICITY	C	
1,2-EPOXY-1,1,2,3,3,3-HEXAFLUOROPROPANE	428-59-1	MUTAGENESIS/GENETIC TOXICITY	C	
ETHIONAMIDE	536-33-4	MUTAGENESIS/GENETIC TOXICITY	A	
ETHYL ALCOHOL	64-17-5	MUTAGENESIS/GENETIC TOXICITY	C	
ETHYL CHLORIDE	75-00-3	MUTAGENESIS/GENETIC TOXICITY	A	
N-ETHYL-N,N-DIPHENYLUREA	18168-01-9	MUTAGENESIS/GENETIC TOXICITY	C	
ETHYLENE OXIDE	75-21-8	MUTAGENESIS/GENETIC TOXICITY	C	
ETHYL ETHER	60-29-7	MUTAGENESIS/GENETIC TOXICITY	C	
N-ETHYL-4-NITROANILINE	3665-80-3	MUTAGENESIS/GENETIC TOXICITY	B	
O-ETHYL PHENOL	90-00-6	MUTAGENESIS/GENETIC TOXICITY	C	
FERRIC AMMONIUM FERROCYANIDE	25869-00-5	MUTAGENESIS/GENETIC TOXICITY	D	
FLURAZEPAM	17617-23-1	MUTAGENESIS/GENETIC TOXICITY	C	
FORMANILIDE	103-70-8	MUTAGENESIS/GENETIC TOXICITY	A	
FORMIC ACID	64-18-6	MUTAGENESIS/GENETIC TOXICITY	C	
FUMARIC ACID DINITRILE	EMTDP-73	MUTAGENESIS/GENETIC TOXICITY	C	
GALLIUM ARSENIDE	1303-00-0	MUTAGENESIS/GENETIC TOXICITY	C	
GILSONITE	12002-43-6	MUTAGENESIS/GENETIC TOXICITY	C	
GUAR GUM	9000-30-0	MUTAGENESIS/GENETIC TOXICITY	C	
GUM ARABIC	9000-01-5	MUTAGENESIS/GENETIC TOXICITY	C	
N-HEPTANAL	111-71-7	MUTAGENESIS/GENETIC TOXICITY	B	
N-HEPTANOIC ACID	111-14-8	MUTAGENESIS/GENETIC TOXICITY	B	
1,2,3,4,6,7-HEXABROMONAPHTHALENE	75625-24-0	MUTAGENESIS/GENETIC TOXICITY	D	
1,2,3,4,7,7-HEXACHLOROBICYCLO-(2.2.1)HMRP-2,5-DIENE	3389-71-7	MUTAGENESIS/GENETIC TOXICITY	C	
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	MUTAGENESIS/GENETIC TOXICITY	C	
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	MUTAGENESIS/GENETIC TOXICITY	C	
1,1,1,3,3,3-HEXAFLUORO-2-PROPANOL	920-66-1	MUTAGENESIS/GENETIC TOXICITY	B	
HEXYLBENZOATE	6789-88-4	MUTAGENESIS/GENETIC TOXICITY	C	
HYCANTHONE METHANESULFONATE	23255-93-8	MUTAGENESIS/GENETIC TOXICITY	B	
HYDROXYLAMINE, HYDROCHLORIDE	5470-11-1	MUTAGENESIS/GENETIC TOXICITY	A	
IODACETIC ACID	64-69-7	MUTAGENESIS/GENETIC TOXICITY	A	
ISOPENTANE	78-78-4	MUTAGENESIS/GENETIC TOXICITY	C	
ISOPROPYL ACETATE	108-21-4	MUTAGENESIS/GENETIC TOXICITY	B	

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N-ISOPROPYLANILINE	768-52-5	MUTAGENESIS/GENETIC TOXICITY	A	
LANTHANUM NITRATE HEXAHYDRATE	10277-43-7	MUTAGENESIS/GENETIC TOXICITY	B	
LAURYL CHLORIDE	112-52-7	MUTAGENESIS/GENETIC TOXICITY	B	
LOCUST BEAN GUM	9000-40-2	MUTAGENESIS/GENETIC TOXICITY	C	
MELPHALAN	148-82-3	MUTAGENESIS/GENETIC TOXICITY	B	
DL-MENTHOL	15356-70-4	MUTAGENESIS/GENETIC TOXICITY	A	
2-MERCAPTO-4-METHYL-5-THIAZOLYL METHYL KETONE	7725-93-1	MUTAGENESIS/GENETIC TOXICITY	C	
6-MERCAPTOPURINE MONOHYDRATE	6112-76-1	MUTAGENESIS/GENETIC TOXICITY	C	
METHANE	74-82-8	MUTAGENESIS/GENETIC TOXICITY	C	
3-((METHOXYCARBONYL)AMINO)PHENYL N-(3-METHYLPHENYL) CARBAMATE	13684-63-4	MUTAGENESIS/GENETIC TOXICITY	A	
2-METHOXYETHANOL	109-86-4	MUTAGENESIS/GENETIC TOXICITY	C	
METHOXYFLURANE	76-38-0	MUTAGENESIS/GENETIC TOXICITY	C	
8-METHOXYPSORALEN	298-81-7	MUTAGENESIS/GENETIC TOXICITY	C	
METHYLBENZOATE	93-58-3	MUTAGENESIS/GENETIC TOXICITY	B	
P-METHYL BENZYL ALCOHOL	589-18-4	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL BIPHENYL	28652-72-4	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL BROMIDE	74-83-9	MUTAGENESIS/GENETIC TOXICITY	D	
METHYL CHLORIDE	74-87-3	MUTAGENESIS/GENETIC TOXICITY	C	
METHYLCYCLOPENTANE	96-37-7	MUTAGENESIS/GENETIC TOXICITY	C	
2,2'-METHYLENE-BIS (4-CHLOROPHENOL)	97-23-4	MUTAGENESIS/GENETIC TOXICITY	C	
2,2'-METHYLENE BIS(PHENYLENEOXYMETHYLENE)BISOXIRANE	39817-09-9	MUTAGENESIS/GENETIC TOXICITY	C	
METHYLENE BIS(THIOCYANATE)	6317-18-6	MUTAGENESIS/GENETIC TOXICITY	A	
METHYLENEDIANILINE	101-77-9	MUTAGENESIS/GENETIC TOXICITY	C	
2-METHYL-2-ETHOXYPROPANE	637-92-3	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL ETHYL KETOXIME	96-29-7	MUTAGENESIS/GENETIC TOXICITY	C	
9-METHYL FLUORENE	2523-37-7	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL FORMATE	107-31-3	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL-P-FORMYL BENZOATE	1571-08-0	MUTAGENESIS/GENETIC TOXICITY	C	
2-METHYL FURAN	534-22-5	MUTAGENESIS/GENETIC TOXICITY	C	
METHYLGLUTARONITRILE	4553-62-2	MUTAGENESIS/GENETIC TOXICITY	A	
2-METHYLGLYCIDYL ACRYLATE	19900-46-0	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL ISOBUTYL KETONE	108-10-1	MUTAGENESIS/GENETIC TOXICITY	C	

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS
IN VITRO MICROBIAL*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
3-METHYL-6-METHOXY-2-AMINO-BENZOTHIAZOLIUM CHLORIDE	NOCAS0884	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL NAPHTHALENE	1321-94-4	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL PENTACHLOROSTEARATE	26638-28-8	MUTAGENESIS/GENETIC TOXICITY	C	
1-METHYL PHENANTHRENE	832-28-8	MUTAGENESIS/GENETIC TOXICITY	C	
2-METHYL PHENANTHRENE	2531-84-2	MUTAGENESIS/GENETIC TOXICITY	C	
1-METHYL PYRENE	2381-21-7	MUTAGENESIS/GENETIC TOXICITY	C	
ALPHA-METHYLSTYRENE	98-83-9	MUTAGENESIS/GENETIC TOXICITY	C	
METHYL SUCCINIC ACID	498-21-5	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL-P-TOLUATE	99-75-2	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL TRIFLUOROMETHANESULFONATE	333-27-7	MUTAGENESIS/GENETIC TOXICITY	A	
METHYL VINYL KETONE	78-94-4	MUTAGENESIS/GENETIC TOXICITY	C	
MEXACARBATE	315-18-4	MUTAGENESIS/GENETIC TOXICITY	D	
MONOSODIUM GLUTAMATE	142-47-2	MUTAGENESIS/GENETIC TOXICITY	B	
NICKEL SUBSULFIDE	12035-72-2	MUTAGENESIS/GENETIC TOXICITY	C	
NIFEDIPINE	21829-25-4	MUTAGENESIS/GENETIC TOXICITY	B	
O-NITROBENZOIC ACID	552-16-9	MUTAGENESIS/GENETIC TOXICITY	A	
2-NITROETHANOL	625-48-9	MUTAGENESIS/GENETIC TOXICITY	A	
2-NITRO-P-PHENYLENEDIAMINE	5307-14-2	MUTAGENESIS/GENETIC TOXICITY	A	
4-NITROPHTHALIC ANHYDRIDE	5466-84-2	MUTAGENESIS/GENETIC TOXICITY	A	
1-NITROPYRENE	5522-43-0	MUTAGENESIS/GENETIC TOXICITY	C	
N-NITROSO-N-ETHYLURETHANE	614-95-9	MUTAGENESIS/GENETIC TOXICITY	C	
4-NITROSOPHENOL	104-91-6	MUTAGENESIS/GENETIC TOXICITY	B	
BETA-NITROSTYRENE	102-96-5	MUTAGENESIS/GENETIC TOXICITY	A	
NONANE	111-84-2	MUTAGENESIS/GENETIC TOXICITY	B	
OLIVETOL	500-66-3	MUTAGENESIS/GENETIC TOXICITY	B	
OXAZEPAM	604-75-1	MUTAGENESIS/GENETIC TOXICITY	C	
1,1-OXYBIS METHYLENE, BIS BENZENE	103-50-4	MUTAGENESIS/GENETIC TOXICITY	C	
A,A,A,3,4-PENTACHLOROTOLUENE	13014-24-9	MUTAGENESIS/GENETIC TOXICITY	C	
2,4,A,A,A-PENTACHLOROTOLUENE	13014-18-1	MUTAGENESIS/GENETIC TOXICITY	C	
N-PENTANAL	110-62-3	MUTAGENESIS/GENETIC TOXICITY	C	
N-PENTANE	109-66-0	MUTAGENESIS/GENETIC TOXICITY	C	
2-PENTANONE	107-87-9	MUTAGENESIS/GENETIC TOXICITY	C	
3-PENTENENITRILE	4635-87-4	MUTAGENESIS/GENETIC TOXICITY	A	
2-PENTENENITRILE	13284-42-9	MUTAGENESIS/GENETIC TOXICITY	B	
PERCHLOROMETHYL MERCAPTAN	594-42-3	MUTAGENESIS/GENETIC TOXICITY	B	
M-PHENETIDINE	621-33-0	MUTAGENESIS/GENETIC TOXICITY	A	

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CONTRACTS
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PHENYLPHOSPHINE	638-21-1	MUTAGENESIS/GENETIC TOXICITY	B	
PHOSPHATE ESTER MIXTURE:NC220	ENTDP-45	MUTAGENESIS/GENETIC TOXICITY	B	
PHTHALIC ACID	88-99-3	MUTAGENESIS/GENETIC TOXICITY	C	
POLYETHYLENE AS	9002-88-4	MUTAGENESIS/GENETIC TOXICITY	C	
POLYSTYRENE	9003-53-6	MUTAGENESIS/GENETIC TOXICITY	C	
POLYTHIAZIDE	346-18-9	MUTAGENESIS/GENETIC TOXICITY	B	
POTASSIUM DICHROMATE	7778-50-9	MUTAGENESIS/GENETIC TOXICITY	B	
PROPIONIC ACID	79-09-4	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYLENE	115-07-1	MUTAGENESIS/GENETIC TOXICITY	B	
QUERCETIN	117-39-5	MUTAGENESIS/GENETIC TOXICITY	C	
QUINETHAZONE (AQUANOX)	73-49-4	MUTAGENESIS/GENETIC TOXICITY	B	
SELSUIN		MUTAGENESIS/GENETIC TOXICITY	C	
SODIUM CYANURATE	2624-17-1	MUTAGENESIS/GENETIC TOXICITY	B	
SODIUM IODOMETHANESULFONATE	126-31-8	MUTAGENESIS/GENETIC TOXICITY	D	
SPIRO(ISOBENZOFURAN-1 (3H) 9'-(9H)XANTHEN)-3-ONE 2',4',4',7'-TETRABROMO-3',6'-DIHYDROXY, DISODIUM SALT	17372-87-1	MUTAGENESIS/GENETIC TOXICITY	A	
TARA GUM	39300-88-4	MUTAGENESIS/GENETIC TOXICITY	C	
1,2,3,4-TCDD	30746-58-8	MUTAGENESIS/GENETIC TOXICITY	C	
1,1,2,3-TETRACHLORO-BUTADIENE	921-09-5	MUTAGENESIS/GENETIC TOXICITY	C	
2,3,5,6-TETRACHLORO-4-NITRO-ANISOLE	2438-88-2	MUTAGENESIS/GENETIC TOXICITY	B	
TETRACHROMIC ACID, POTASSIUM ZINC SALT	12433-50-0	MUTAGENESIS/GENETIC TOXICITY	A	
TETRAFLUOROETHYLENE	116-14-3	MUTAGENESIS/GENETIC TOXICITY	C	
1,3,6,8-TETRANITROPYRENE	28767-61-5	MUTAGENESIS/GENETIC TOXICITY	C	
THIOPHANATE M	23564-05-8	MUTAGENESIS/GENETIC TOXICITY	A	
P-TOLUIC ACID	25567-10-6	MUTAGENESIS/GENETIC TOXICITY	C	
P-TOLUNITRILE	104-85-8	MUTAGENESIS/GENETIC TOXICITY	A	
TRIBENZYL ISOCYANURATE	606-03-1	MUTAGENESIS/GENETIC TOXICITY	C	
TRIBUTYL PHOSPHATE	126-73-8	MUTAGENESIS/GENETIC TOXICITY	C	
2,4,6-TRICHLOROANILINE	634-93-5	MUTAGENESIS/GENETIC TOXICITY	C	
TRICHLOROMELAMINE	7673-09-8	MUTAGENESIS/GENETIC TOXICITY	B	
2,4,6-TRICHLORONITROBENZENE	18708-70-8	MUTAGENESIS/GENETIC TOXICITY	B	
3,4,6-TRICHLORO-2-NITROPHENOL	82-62-2	MUTAGENESIS/GENETIC TOXICITY	B	
TRIMETHYL ISOCYANURATE	827-16-7	MUTAGENESIS/GENETIC TOXICITY	C	
TRIMETHYLPHOSPHATE	512-56-1	MUTAGENESIS/GENETIC TOXICITY	C	
1,3,6-TRINITROPYRENE	75321-19-6	MUTAGENESIS/GENETIC TOXICITY	C	

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CONTRACTS
IN VITRO MICROBIAL*

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2,4,6-TRINITROTOLUENE	118-96-7	MUTAGENESIS/GENETIC TOXICITY	B	
TRI-N-PROPYLAMINE	102-69-2	MUTAGENESIS/GENETIC TOXICITY	B	
TRIS(CARBAMOYLMETHYL)ISOCYANURATE	1843-48-7	MUTAGENESIS/GENETIC TOXICITY	C	
TRIS(2,3-EPOXYPROPYL)-ISOCYANURATE	2451-62-9	MUTAGENESIS/GENETIC TOXICITY	A	
TRIS(2-KETOPROPYL)ISOCYANURATE	61050-97-3	MUTAGENESIS/GENETIC TOXICITY	C	
TRISODIUM NITRILOTRIACETATE MONOHYDRATE	18662-53-8	MUTAGENESIS/GENETIC TOXICITY	B	
TRIS(TRIPHENYLSTANNYL)ISOCYANURATE	752-74-9	MUTAGENESIS/GENETIC TOXICITY	C	
P-TRITOLYL PHOSPHATE	78-32-0	MUTAGENESIS/GENETIC TOXICITY	D	
O-TRITOLYL PHOSPHATE	78-30-8	MUTAGENESIS/GENETIC TOXICITY	D	
URETHANE	51-79-6	MUTAGENESIS/GENETIC TOXICITY	B	
UROTROPINE	100-97-0	MUTAGENESIS/GENETIC TOXICITY	A	
VALERONITRILE	110-59-8	MUTAGENESIS/GENETIC TOXICITY	A	
VANADIUM PENTOXIDE	1314-62-1	MUTAGENESIS/GENETIC TOXICITY	C	
VINYLIDENE FLUORIDE	75-38-7	MUTAGENESIS/GENETIC TOXICITY	C	
VITAMIN D	1406-16-2	MUTAGENESIS/GENETIC TOXICITY	A	

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS
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ACETALDEHYDE	75-07-0	MUTAGENESIS/GENETIC TOXICITY	B	
ACETAMINOPHEN	103-90-2	MUTAGENESIS/GENETIC TOXICITY	B	
ACETONE	67-64-1	MUTAGENESIS/GENETIC TOXICITY	B	
4-ACETYL PYRIDINE	1122-54-9	MUTAGENESIS/GENETIC TOXICITY	B	
ACRYLAMIDE	79-06-1	MUTAGENESIS/GENETIC TOXICITY	B	
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	MUTAGENESIS/GENETIC TOXICITY	B	
3-AMINO-4-ETHOXYACETANILIDE	17026-81-2	MUTAGENESIS/GENETIC TOXICITY	B	
3-AMINO-9-ETHYLCARBAZOLE	6109-97-3	MUTAGENESIS/GENETIC TOXICITY	B	
1-AMINO-2-METHYLANTHRAQUINONE	82-28-0	MUTAGENESIS/GENETIC TOXICITY	B	
4-AMINO-2-NITROPHENOL	119-34-6	MUTAGENESIS/GENETIC TOXICITY	B	
2-AMINO-5-NITROTHIAZOLE	121-66-4	MUTAGENESIS/GENETIC TOXICITY	B	
AMPHETAMINE SULFATE	60-13-9	MUTAGENESIS/GENETIC TOXICITY	B	
AMPHOTERICIN B	1397-89-3	MUTAGENESIS/GENETIC TOXICITY	B	
AROCLOR 1254	11097-69-1	MUTAGENESIS/GENETIC TOXICITY	B	
AZINPHOSMETHYL	86-50-0	MUTAGENESIS/GENETIC TOXICITY	B	
AZODICARBONAMIDE	123-77-3	MUTAGENESIS/GENETIC TOXICITY	A	
BENZONITRILE	100-47-0	MUTAGENESIS/GENETIC TOXICITY	B	ALL IN VITRO CYTOGENETIC TESTS ARE TO BE PERFORMED AT ONE OR MORE OF THE FOLLOWING ORGANIZATIONS: AMERICAN BIOGENICS/N01ES-3-5029 HAZLETON BIOTECHNOLOGIES/N01-ES-3-5030 ENV. HLTH. RES. AND TEST. INC.,/ N01-ES-1-5789
BENZO(A)PYRENE	50-32-8	MUTAGENESIS/GENETIC TOXICITY	B	
BENZYL CHLORIDE	100-44-7	MUTAGENESIS/GENETIC TOXICITY	B	
N,N'-BIS(1,4-DIMETHYLPENTYL)-P-PHENYLENEDIAMINE	3081-14-9	MUTAGENESIS/GENETIC TOXICITY	B	
BISPHENOL A DIGLYCIDYL ETHER	1675-54-3	MUTAGENESIS/GENETIC TOXICITY	A	
1,3-BUTADIENE	106-99-0	MUTAGENESIS/GENETIC TOXICITY	B	
N-BUTANE	106-97-8	MUTAGENESIS/GENETIC TOXICITY	B	
2-BUTOXYETHANOL	111-76-2	MUTAGENESIS/GENETIC TOXICITY	B	
N-BUTYL ACRYLATE	141-32-2	MUTAGENESIS/GENETIC TOXICITY	B	
T-BUTYLHYDROQUINONE	1948-33-0	MUTAGENESIS/GENETIC TOXICITY	B	
CAPTAN	133-06-2	MUTAGENESIS/GENETIC TOXICITY	B	
CARBENDAZIM	10605-21-7	MUTAGENESIS/GENETIC TOXICITY	B	
CARBON DISULFIDE	75-15-0	MUTAGENESIS/GENETIC TOXICITY	B	
CARBON TETRACHLORIDE	56-23-5	MUTAGENESIS/GENETIC TOXICITY	B	
CARISOPRODOL	78-44-4	MUTAGENESIS/GENETIC TOXICITY	A	
D-CARVONE	2244-16-8	MUTAGENESIS/GENETIC TOXICITY	B	
CASTOR OIL	8001-79-4	MUTAGENESIS/GENETIC TOXICITY	B	
CHLORDANE	12789-03-6	MUTAGENESIS/GENETIC TOXICITY	A	
CHLORENDIC ACID	115-28-6	MUTAGENESIS/GENETIC TOXICITY	A	

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CHLORINATED PARAFFINS: C12, 60% CHLORINE	63449-39-8	MUTAGENESIS/GENETIC TOXICITY	B	
CHLOROACETOPHENONE (CN)	532-27-4	MUTAGENESIS/GENETIC TOXICITY	B	
CHLOROPICRIN	76-06-2	MUTAGENESIS/GENETIC TOXICITY	B	
CHLOROPRENE	126-99-8	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. ACID ORANGE 3	6373-74-6	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. DIRECT BLACK 38	1937-37-7	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. DISPERSE BLUE 1	2475-45-8	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. PIGMENT RED 3	2425-85-6	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. PIGMENT RED 23	6471-49-4	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. VAT YELLOW 4	128-66-5	MUTAGENESIS/GENETIC TOXICITY	B	
COCONUT DIETHANOLAMIDE	68603-42-9	MUTAGENESIS/GENETIC TOXICITY	B	
M-CRESIDINE	102-50-1	MUTAGENESIS/GENETIC TOXICITY	B	
P-CRESIDINE	120-71-8	MUTAGENESIS/GENETIC TOXICITY	B	
CUPFERRON	135-20-6	MUTAGENESIS/GENETIC TOXICITY	B	
CYCLOPHOSPHAMIDE	50-18-0	MUTAGENESIS/GENETIC TOXICITY	B	
CYCLOSPORIN A	59865-13-3	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-DIAMINOANISOLE SULFATE	39156-41-7	MUTAGENESIS/GENETIC TOXICITY	B	
4,4'-DIAMINO-2,2'-STILBENEDISULFONIC ACID	81-11-8	MUTAGENESIS/GENETIC TOXICITY	B	
DIARYLANILIDE YELLOW	6358-85-6	MUTAGENESIS/GENETIC TOXICITY	A	
2,3-DIBROMO-1-PROPANOL	96-13-9	MUTAGENESIS/GENETIC TOXICITY	B	
DICHLOROACETONITRILE	3018-12-0	MUTAGENESIS/GENETIC TOXICITY	A	
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	MUTAGENESIS/GENETIC TOXICITY	B	
2,7-DICHLORODIBENZO-P-DIOXIN	33857-26-0	MUTAGENESIS/GENETIC TOXICITY	B	
DICHLORODIPHENYLTRICHLOROETHANE	50-29-3	MUTAGENESIS/GENETIC TOXICITY	B	
1,2-DICHLOROETHANE	107-06-2	MUTAGENESIS/GENETIC TOXICITY	B	
1,1-DICHLOROETHANE	75-34-3	MUTAGENESIS/GENETIC TOXICITY	B	
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	MUTAGENESIS/GENETIC TOXICITY	B	
2,3-DICHLOROPROPYLENE	78-88-6	MUTAGENESIS/GENETIC TOXICITY	B	
DIELDRIN	60-57-1	MUTAGENESIS/GENETIC TOXICITY	A	
DI(P-ETHYLPHENYL) DICHLOROETHANE	72-56-0	MUTAGENESIS/GENETIC TOXICITY	B	
N,N-DIETHYL-P-PHENYLENEDIAMINE	93-05-0	MUTAGENESIS/GENETIC TOXICITY	B	
3,4-DIHYDROCOUMARIN	119-84-6	MUTAGENESIS/GENETIC TOXICITY	B	
3,3'-DIMETHOXYBENZIDINE-4,4'-DIISOCYANATE	91-93-0	MUTAGENESIS/GENETIC TOXICITY	B	
4,4'-DIMETHOXYDIPHENYLAMINE	101-70-2	MUTAGENESIS/GENETIC TOXICITY	B	

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DIMETHYL PHTHALATE	131-11-3	MUTAGENESIS/GENETIC TOXICITY	B	
DIMETHYL SULFOXIDE	67-68-5	MUTAGENESIS/GENETIC TOXICITY	B	
N,N'-DI-2-NAPTHYL-P-PHENYLENE-DIAMINE	93-46-9	MUTAGENESIS/GENETIC TOXICITY	B	
2,7-DINITRO-9H-FLUOREN-9-ONE	31551-45-8	MUTAGENESIS/GENETIC TOXICITY	A	
4,4'-DIOCTYLDIPHENYLAMINE	101-67-7	MUTAGENESIS/GENETIC TOXICITY	B	
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	MUTAGENESIS/GENETIC TOXICITY	A	
DOXYLAMINE SUCCINATE	562-10-7	MUTAGENESIS/GENETIC TOXICITY	B	
ELLAGIC ACID	476-66-4	MUTAGENESIS/GENETIC TOXICITY	B	
ENDOSULFAN	115-29-7	MUTAGENESIS/GENETIC TOXICITY	B	
EPHEDRINE SULFATE	134-72-5	MUTAGENESIS/GENETIC TOXICITY	A	
EPINEPHRINE	51-43-4	MUTAGENESIS/GENETIC TOXICITY	B	
ETHIONAMIDE	536-33-4	MUTAGENESIS/GENETIC TOXICITY	B	
ETHYL ACETATE	141-78-6	MUTAGENESIS/GENETIC TOXICITY	B	
ETHYL CHLORIDE	75-00-3	MUTAGENESIS/GENETIC TOXICITY	B	
ETHYLENE OXIDE	75-21-8	MUTAGENESIS/GENETIC TOXICITY	A	
2-ETHYLHEXANOL	104-76-7	MUTAGENESIS/GENETIC TOXICITY	A	
FD & C YELLOW NO. 6	2783-94-0	MUTAGENESIS/GENETIC TOXICITY	A	
FERRIC AMMONIUM FERROCYANIDE	25869-00-5	MUTAGENESIS/GENETIC TOXICITY	D	
FLUOMETURON	2164-17-2	MUTAGENESIS/GENETIC TOXICITY	B	
FLURAZEPAM	17617-23-1	MUTAGENESIS/GENETIC TOXICITY	B	
FUMARIC ACID DINITRILE	EMTDP-73	MUTAGENESIS/GENETIC TOXICITY	B	
FURAN	110-00-9	MUTAGENESIS/GENETIC TOXICITY	A	
FUROSEMIDE	54-31-9	MUTAGENESIS/GENETIC TOXICITY	B	
HC RED 3	2871-01-4	MUTAGENESIS/GENETIC TOXICITY	B	
HEXACHLOROBENZENE	118-74-1	MUTAGENESIS/GENETIC TOXICITY	A	
HEXACHLOROCYCLOPENTADIENE	77-47-4	MUTAGENESIS/GENETIC TOXICITY	A	
HEXACHLOROPHENE	70-30-4	MUTAGENESIS/GENETIC TOXICITY	B	
N-HEXANE	110-54-3	MUTAGENESIS/GENETIC TOXICITY	B	
1,6-HEXANEDIAMINE, DIHYDROCHLORIDE	6055-52-3	MUTAGENESIS/GENETIC TOXICITY	B	
2-HYDROXY-4-METHOXY-BENZOPHENONE	131-57-7	MUTAGENESIS/GENETIC TOXICITY	B	
IODINATED GLYCEROL	5634-39-9	MUTAGENESIS/GENETIC TOXICITY	B	
ISOPENTANE	78-78-4	MUTAGENESIS/GENETIC TOXICITY	B	
ISOPRENE	78-79-5	MUTAGENESIS/GENETIC TOXICITY	B	
P-ISOPROPOXYDIPHENYLAMINE	101-73-5	MUTAGENESIS/GENETIC TOXICITY	B	

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176

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS
IN VITRO CYTOGENETIC CHO CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
N-ISOPROPYL-N'-PHENYL-P-PHENYLENEDIAMINE	101-72-4	MUTAGENESIS/GENETIC TOXICITY	B	
LAURIC ACID DIETHANOLAMINE CONDENSATE	120-40-1	MUTAGENESIS/GENETIC TOXICITY	B	
MALTOL	118-71-8	MUTAGENESIS/GENETIC TOXICITY	B	
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-60-0	MUTAGENESIS/GENETIC TOXICITY	B	
2-METHOXYETHYL ACETATE	110-49-6	MUTAGENESIS/GENETIC TOXICITY	B	
8-METHOXYPSORALEN	298-81-7	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL ETHYL KETOXIME	96-29-7	MUTAGENESIS/GENETIC TOXICITY	B	
N-METHYLOLACRYLAMIDE	924-42-5	MUTAGENESIS/GENETIC TOXICITY	B	
6-METHYLQUINOLINE	91-62-3	MUTAGENESIS/GENETIC TOXICITY	B	
8-METHYLQUINOLINE	611-32-5	MUTAGENESIS/GENETIC TOXICITY	B	
7-METHYLQUINOLINE	612-60-2	MUTAGENESIS/GENETIC TOXICITY	B	
ALPHA-METHYLSTYRENE	98-83-9	MUTAGENESIS/GENETIC TOXICITY	B	
NAPHTHALENE	91-20-3	MUTAGENESIS/GENETIC TOXICITY	B	
1-NAPHTHYLAMINE	134-32-7	MUTAGENESIS/GENETIC TOXICITY	B	
NITHIAZIDE	139-94-6	MUTAGENESIS/GENETIC TOXICITY	B	
9-NITROANTHRACENE	602-60-8	MUTAGENESIS/GENETIC TOXICITY	A	
4-NITRO-1,3-BENZENEDIAMINE	5131-58-8	MUTAGENESIS/GENETIC TOXICITY	B	
O-NITROBENZOIC ACID	552-16-9	MUTAGENESIS/GENETIC TOXICITY	B	
P-NITROBENZOYL CHLORIDE	122-04-3	MUTAGENESIS/GENETIC TOXICITY	A	
NITROFURANTOIN	67-20-9	MUTAGENESIS/GENETIC TOXICITY	B	
N-NITROSODIPHENYLAMINE	86-30-6	MUTAGENESIS/GENETIC TOXICITY	B	
P-NITROSODIPHENYLAMINE	156-10-5	MUTAGENESIS/GENETIC TOXICITY	B	
BETA-NITROSTYRENE	102-96-5	MUTAGENESIS/GENETIC TOXICITY	B	
OCHRATOXIN A	303-47-9	MUTAGENESIS/GENETIC TOXICITY	B	
OLEIC ACID DIETHANOLAMINE	13961-86-9	MUTAGENESIS/GENETIC TOXICITY	B	
OXAZEPAM	604-75-1	MUTAGENESIS/GENETIC TOXICITY	B	
PENTAERYTHRITOL TETRANITRATE	78-11-5	MUTAGENESIS/GENETIC TOXICITY	B	
PHENESTERIN	3546-10-9	MUTAGENESIS/GENETIC TOXICITY	B	
O-PHENYLENEDIAMINE	95-54-5	MUTAGENESIS/GENETIC TOXICITY	B	
M-PHENYLENEDIAMINE	108-45-2	MUTAGENESIS/GENETIC TOXICITY	A	
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	MUTAGENESIS/GENETIC TOXICITY	A	
PICRIC ACID	88-89-1	MUTAGENESIS/GENETIC TOXICITY	B	
POLYSORBATE 80 (GLYCOL)	9005-65-6	MUTAGENESIS/GENETIC TOXICITY	B	
PROBENECID	57-66-9	MUTAGENESIS/GENETIC TOXICITY	B	
PROPIONITRILE	107-12-0	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYLENE	115-07-1	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYLENE OXIDE	75-56-9	MUTAGENESIS/GENETIC TOXICITY	A	

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS
IN VITRO CYTOGENETIC CHO CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
1,3-PROPYLENE OXIDE	503-30-0	MUTAGENESIS/GENETIC TOXICITY	A	
PYRILAMINE	91-84-9	MUTAGENESIS/GENETIC TOXICITY	B	
QUERCETIN	117-39-5	MUTAGENESIS/GENETIC TOXICITY	B	
RHODAMINE 6G	989-38-3	MUTAGENESIS/GENETIC TOXICITY	B	
ROXARSONE	121-19-7	MUTAGENESIS/GENETIC TOXICITY	B	
SALICYLAZOSULFAPYRIDINE	599-79-1	MUTAGENESIS/GENETIC TOXICITY	B	
SCOPOLAMINE HYDROBROMIDE	114-49-8	MUTAGENESIS/GENETIC TOXICITY	B	
SODIUM AZIDE	26628-22-8	MUTAGENESIS/GENETIC TOXICITY	B	
SODIUM XYLENESULFONATE	1300-72-7	MUTAGENESIS/GENETIC TOXICITY	B	
STYRENE	100-42-5	MUTAGENESIS/GENETIC TOXICITY	B	
SULFAMETHAZINE	57-68-1	MUTAGENESIS/GENETIC TOXICITY	B	
TETRACHLORODIPHENYLETHANE	72-54-8	MUTAGENESIS/GENETIC TOXICITY	B	
2,3,4,6-TETRACHLOROPHENOL	58-90-2	MUTAGENESIS/GENETIC TOXICITY	B	
2,3,4,5-TETRACHLOROPHENOL	4901-51-3	MUTAGENESIS/GENETIC TOXICITY	B	
TETRACHLORVINPHOS	961-11-5	MUTAGENESIS/GENETIC TOXICITY	B	
TETRAFLUOROETHYLENE	116-14-3	MUTAGENESIS/GENETIC TOXICITY	B	
TETRAKIS(HYDROXYMETHYL) PHOSPHONIUM SULFATE	55566-30-8	MUTAGENESIS/GENETIC TOXICITY	B	
N,N,N',N'-TETRAMETHYL-P-PHENYLENEDIAMINE	100-22-1	MUTAGENESIS/GENETIC TOXICITY	C	
TETRANITROMETHANE	509-14-8	MUTAGENESIS/GENETIC TOXICITY	B	
4,4'-THIODIANILINE	139-65-1	MUTAGENESIS/GENETIC TOXICITY	B	
TITANOCENE DICHLORIDE	1271-19-8	MUTAGENESIS/GENETIC TOXICITY	B	
TOLUENE (NITRATION GRADE)	108-88-3	MUTAGENESIS/GENETIC TOXICITY	D	
2,4-&2,6-TOLUENE DIISOCYANATE	26471-62-5	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-TOLUENE DIISOCYANATE	584-84-9	MUTAGENESIS/GENETIC TOXICITY	A	
TRIALLYL ISOCYANURATE	1025-15-6	MUTAGENESIS/GENETIC TOXICITY	B	
1,1,2-TRICHLOROETHANE	79-00-5	MUTAGENESIS/GENETIC TOXICITY	B	
2,3,5-TRICHLOROPHENOL	933-78-8	MUTAGENESIS/GENETIC TOXICITY	B	
TRIMELLITIC ANHYDRIDE	552-30-7	MUTAGENESIS/GENETIC TOXICITY	B	
TRIMETHYLPHOSPHATE	512-56-1	MUTAGENESIS/GENETIC TOXICITY	B	
TRIS- (2,3-EPOXYPROPYL) ISOCYANURATE	2451-62-9	MUTAGENESIS/GENETIC TOXICITY	B	
TRIS(2-ETHYLHEXYL) PHOSPHITE	301-13-3	MUTAGENESIS/GENETIC TOXICITY	B	
TURMERIC, OLEORESIN (CURCUMIN)	8024-37-1	MUTAGENESIS/GENETIC TOXICITY	B	
URETHANE	51-79-6	MUTAGENESIS/GENETIC TOXICITY	B	
VALIUM (DIAZEPAM)	439-14-5	MUTAGENESIS/GENETIC TOXICITY	B	

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0173

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CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
VINYLIDENE CHLORIDE (1,1-DICHLORO-ETHYLENE)	75-35-4	MUTAGENESIS/GENETIC TOXICITY	D	
VINYLIDENE FLUORIDE	75-38-7	MUTAGENESIS/GENETIC TOXICITY	D	
WOLLASTONITE CALCIUM SILICATES	13983-17-0	MUTAGENESIS/GENETIC TOXICITY	B	
XYLENES, COMMERCIAL MIXTURE	1330-20-7	MUTAGENESIS/GENETIC TOXICITY	B	

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
CONTRACTS
DROSOPHILA*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACRYLAMIDE	79-06-1	MUTAGENESIS/GENETIC TOXICITY	B	
AMPHETAMINE SULFATE	60-13-9	MUTAGENESIS/GENETIC TOXICITY	B	
L-ASCORBIC ACID	50-81-7	MUTAGENESIS/GENETIC TOXICITY	B	
BENZENE	71-43-2	MUTAGENESIS/GENETIC TOXICITY	B	
BENZIDINE	92-87-5	MUTAGENESIS/GENETIC TOXICITY	B	
BENZOIN	119-53-9	MUTAGENESIS/GENETIC TOXICITY	B	ALL DROSOPHILA TESTS ARE TO BE PERFORMED AT ONE OR BOTH OF THE FOLLOWING ORGANIZATIONS: BROWN UNIV/N01-ES-3-5027 UNIV. OF WISCONSIN/N01-ES-3-5028
BISPHENOL A	80-05-7	MUTAGENESIS/GENETIC TOXICITY	B	
1,3-BUTADIENE	106-99-0	MUTAGENESIS/GENETIC TOXICITY	A	
N-BUTANE	106-97-8	MUTAGENESIS/GENETIC TOXICITY	B	
N-BUTYL ACRYLATE	141-32-2	MUTAGENESIS/GENETIC TOXICITY	B	
CAPROLACTAM	105-60-2	MUTAGENESIS/GENETIC TOXICITY	B	
CARBON TETRACHLORIDE	56-23-5	MUTAGENESIS/GENETIC TOXICITY	B	
3-CHLORO-2-METHYLPROPENE	563-47-3	MUTAGENESIS/GENETIC TOXICITY	B	
4-CHLORO-M-PHENYLENEDIAMINE	5131-60-2	MUTAGENESIS/GENETIC TOXICITY	B	
4-CHLORO-O-PHENYLENEDIAMINE	95-83-0	MUTAGENESIS/GENETIC TOXICITY	B	
2-CHLORO-P-PHENYLENEDIAMINE SULFATE	61702-44-1	MUTAGENESIS/GENETIC TOXICITY	B	
CHLOROPRENE	126-99-8	MUTAGENESIS/GENETIC TOXICITY	B	
3-CHLORO-P-TOLUIDINE	95-74-9	MUTAGENESIS/GENETIC TOXICITY	B	
4-CHLORO-O-TOLUIDINE HYDROCHLORIDE	3165-93-3	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. ACID ORANGE 10	1936-15-8	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. ACID RED 14	3567-69-9	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. DISPERSE YELLOW 3	2832-40-8	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. SOLVENT YELLOW 14	842-07-9	MUTAGENESIS/GENETIC TOXICITY	B	
2,4-DIAMINOTOLUENE	95-80-7	MUTAGENESIS/GENETIC TOXICITY	B	
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	MUTAGENESIS/GENETIC TOXICITY	B	
DIBROMOMANNITOL	488-41-5	MUTAGENESIS/GENETIC TOXICITY	A	
DICHLORAN	99-30-9	MUTAGENESIS/GENETIC TOXICITY	A	
1,2-DICHLOROBENZENE (O_DICHLOROBENZENE)	95-50-1	MUTAGENESIS/GENETIC TOXICITY	B	
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	MUTAGENESIS/GENETIC TOXICITY	B	
2,6-DICHLORO-P-PHENYLENEDIAMINE	609-20-1	MUTAGENESIS/GENETIC TOXICITY	B	
1,8-DIHYDROXY-4,5-DINITROANTHRAQUINONE	81-55-0	MUTAGENESIS/GENETIC TOXICITY	A	
DIMETHYLFORMAMIDE	68-12-2	MUTAGENESIS/GENETIC TOXICITY	A	

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CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
EPICHLORHYDRIN	106-89-8	MUTAGENESIS/GENETIC TOXICITY	B	
ETHOXYLATED DODECYL ALCOHOL	9002-92-0	MUTAGENESIS/GENETIC TOXICITY	B	
ETHYL ALCOHOL	64-17-5	MUTAGENESIS/GENETIC TOXICITY	B	
ETHYLENE OXIDE	75-21-8	MUTAGENESIS/GENETIC TOXICITY	B	
FD AND C YELLOW NO. 6	2783-94-0	MUTAGENESIS/GENETIC TOXICITY	B	
FORMAMIDE	75-12-7	MUTAGENESIS/GENETIC TOXICITY	B	
GERANYL ACETATE	105-87-3	MUTAGENESIS/GENETIC TOXICITY	B	
HC BLUE 2	33229-34-4	MUTAGENESIS/GENETIC TOXICITY	A	
HEXAMETHYLPHOSPHORAMIDE	680-31-9	MUTAGENESIS/GENETIC TOXICITY	B	
HYDROQUINONE	123-31-9	MUTAGENESIS/GENETIC TOXICITY	A	
2-HYDROXY-1,4-NAPHTHOQUINONE	83-72-7	MUTAGENESIS/GENETIC TOXICITY	A	
8-HYDROXYQUINOLINE	148-24-3	MUTAGENESIS/GENETIC TOXICITY	B	
8-HYDROXYQUINOLINE SULFATE	134-31-6	MUTAGENESIS/GENETIC TOXICITY	A	
ISOPENTANE	78-78-4	MUTAGENESIS/GENETIC TOXICITY	B	
ISOPRENE	78-79-5	MUTAGENESIS/GENETIC TOXICITY	C	
MALAOXON	1634-78-2	MUTAGENESIS/GENETIC TOXICITY	B	
MALTOL	118-71-8	MUTAGENESIS/GENETIC TOXICITY	A	
D-MANNITOL	69-65-8	MUTAGENESIS/GENETIC TOXICITY	A	
DL-MENTHOL	15356-70-4	MUTAGENESIS/GENETIC TOXICITY	B	
6-MERCAPTOPURINE MONOHYDRATE	6112-76-1	MUTAGENESIS/GENETIC TOXICITY	B	
4,4'-METHYLENEDIANILINE DIHYDROCHLORIDE	13552-44-8	MUTAGENESIS/GENETIC TOXICITY	B	
MYLERAN	55-98-1	MUTAGENESIS/GENETIC TOXICITY	B	
O-NITROPHENOL	88-75-5	MUTAGENESIS/GENETIC TOXICITY	B	
M-NITROPHENOL	554-84-7	MUTAGENESIS/GENETIC TOXICITY	A	
4-NITRO-O-PHENYLENEDIAMINE	99-56-9	MUTAGENESIS/GENETIC TOXICITY	B	
NTA(NITRILOTRIACETIC ACID)	139-13-9	MUTAGENESIS/GENETIC TOXICITY	A	
4,4'-OXYDIANILINE	101-80-4	MUTAGENESIS/GENETIC TOXICITY	B	
PENTAETHYLENEHEXAMINE	4067-16-7	MUTAGENESIS/GENETIC TOXICITY	A	
P-PHENYLENEDIAMINE DIHYDROCHLORIDE	624-18-0	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYLENE	115-07-1	MUTAGENESIS/GENETIC TOXICITY	B	
1,2-PROPYLENE OXIDE	75-56-9	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYL GALLATE	121-79-9	MUTAGENESIS/GENETIC TOXICITY	B	
QUINOLINE SULFATE	530-66-5	MUTAGENESIS/GENETIC TOXICITY	B	
ROXARSONE	121-19-7	MUTAGENESIS/GENETIC TOXICITY	A	
SELENIUM SULFIDE	7446-34-6	MUTAGENESIS/GENETIC TOXICITY	B	
STANNOUS CHLORIDE	7772-99-8	MUTAGENESIS/GENETIC TOXICITY	B	
SULFISOXAZOLE	127-69-5	MUTAGENESIS/GENETIC TOXICITY	B	

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TETRACHLOROPHTHALIC ANHYDRIDE	117-08-8	MUTAGENESIS/GENETIC TOXICITY	B	
TETRAETHYLENEPENTAMINE	112-57-2	MUTAGENESIS/GENETIC TOXICITY	A	
1-TRANS-DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	MUTAGENESIS/GENETIC TOXICITY	B	
3,3',5,5'-TETRAMETHYLBENZIDINE	54827-17-7	MUTAGENESIS/GENETIC TOXICITY	B	
TITANIUM DIOXIDE	13463-67-7	MUTAGENESIS/GENETIC TOXICITY	B	
2,6-TOLUENEDIAMINE DIHYDROCHLORIDE	15481-70-6	MUTAGENESIS/GENETIC TOXICITY	B	
1,1,2-TRICHLOROETHANE	79-00-5	MUTAGENESIS/GENETIC TOXICITY	B	
TRICHLOROETHYLENE (WITHOUT EPICHLOROHYDRIN)	79-01-6	MUTAGENESIS/GENETIC TOXICITY	A	
URETHANE	51-79-6	MUTAGENESIS/GENETIC TOXICITY	B	

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
LONG TERM ANIMAL STUDIES*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETONE	67-64-1	CARCINOGENESIS	C	MICROBIOLOGICAL ASSICIATES
ACETONITRILE	75-05-8	CARCINOGENESIS	B	BATTELLE NORTHWEST
ACID ORANGE NO. 3	6373-74-6	CARCINOGENESIS	A	SOUTHERN RES. INST.
ALLYL GLYCIDYL ETHER	106-92-3	CARCINOGENESIS	B	BATTELLE NORTHWEST
9-AMINOACRIDINE HYDROCHLORIDE	134-50-9	CARCINOGENESIS	B	BIOASSAY SYSTEMS
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	CARCINOGENESIS	B	MASON RES. INST.
2-AMINO-4-NITROPHENOL	99-57-0	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
2-AMINO-5-NITROPHENOL	121-88-0	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
2-(4-AMINOPHENYL)-6-METHYL-7-BENZOTHIAZOLE	130-17-6	CARCINOGENESIS	B	SOUTHERN RES. INST.
DL-AMPHETAMINE SULFATE	60-13-9	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOCIATES
ANTIMONY POTASSIUM TARTRATE	28300-74-5	CARCINOGENESIS	C	BATTELLE COLUMBUS
AZODICARBONAMIDE	123-77-3	CARCINOGENESIS	B	INTERNATIONAL R AND D CORP
BARIUM CHLORIDE DIHYDRATE	10326-27-9	CARCINOGENESIS	B	SRI INTERNATIONAL/N01-ES-28015
BENZALDEHYDE	100-52-7	CARCINOGENESIS	B	SOUTHERN RES INST/N01-CP-95651
BENZETHONIUM CHLORIDE	121-54-0	CARCINOGENESIS	C	BATTELLE COLUMBUS
BENZOFURAN	271-89-6	CARCINOGENESIS	B	SPRINGBORN INST. FOR BIORESEARCH
BENZONITRILE	100-47-0	CARCINOGENESIS	B	BATTELLE COLUMBUS
BENZOYL CHLORIDE	98-88-4	CARCINOGENESIS	D	
BENZYL ACETATE	140-11-4	CARCINOGENESIS	B	SOUTHERN RES. INST.
BENZYL ALCOHOL	100-51-6	CARCINOGENESIS	A	MICROBIOLOGICAL ASSOC.
O-BENZYL-P-CHLOROPHENOL	120-32-1	CARCINOGENESIS	B	BATTELLE-COLUMBUS/N01-CP-95653
2,2-BIS(BROMOMETHYL)-1,3-PROPANEDIOL	3296-90-0	CARCINOGENESIS	B	BIOASSAY SYSTEMS
BROMOBENZENE	108-86-1	CARCINOGENESIS	B	BATTELLE NORTHWEST
BROMOBENZENE	108-86-1	CARCINOGENESIS	B	BATTELLE NORTHWEST
2-BROMO-4,6-DINITROANILINE	1817-73-8	CARCINOGENESIS	D	
2-BROMO-4,6-DINITROANILINE	1817-73-8	CARCINOGENESIS	D	
BROMOFORM	75-25-2	CARCINOGENESIS	A	MASON RESEARCH INST.
1,3-BUTADIENE	106-99-0	CARCINOGENESIS	B	BATTELLE NORTHWEST
2-BUTANONE PEROXIDE	1338-23-4	CARCINOGENESIS	C	LITTON BIONETICS
T-BUTYL ALCOHOL	75-65-0	CARCINOGENESIS	B	SOUTHERN RES. INST.
BUTYL BENZYL PHTHALATE	85-68-7	CARCINOGENESIS	B	LITTON BIONETICS
TERT-BUTYL PERBENZOATE	614-45-9	CARCINOGENESIS	B	BATTELLE COLUMBUS
BUTYRALDEHYDE	123-72-8	CARCINOGENESIS	B	LITTON BIONETICS
GAMMA-BUTYROLACTONE	96-48-0	CARCINOGENESIS	B	SOUTHERN RES. INST.
CARISOPRODOL	78-44-4	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
D-CARVONE	2244-16-8	CARCINOGENESIS	B	INTERNATIONAL R AND D CORP.

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CASTOR OIL	8001-79-4	CARCINOGENESIS	B	GULF SOUTH RES. INST.
CHLORAMINE	10599-90-3	CARCINOGENESIS	B	SOUTHERN RES. INST.
CHLOROACETOPHENONE	532-27-4	CARCINOGENESIS	B	BATTELLE NORTHWEST
P-CHLOROANILINE	106-47-8	CARCINOGENESIS	A	BATTELLE-COLUMBUS
O-CHLOROBENZALMALONITRILE	2698-41-1	CARCINOGENESIS	B	BATTELLE NORTHWEST
4-CHLORO-2-NITROANILINE	89-63-4	CARCINOGENESIS	B	LITTON BIONETICS
CHLOROPRENE	126-99-8	CARCINOGENESIS	B	BATTELLE NORTHWEST
2-CHLORO-1-PROPANOL + 1-CHLORO-2-PROPANOL		CARCINOGENESIS	B	SRI INTERNATIONAL
C.I. ACID RED 114	6459-94-5	CARCINOGENESIS	B	HAZLETON/N01-CP-95655
C.I. DIRECT BLUE 15	2429-74-5	CARCINOGENESIS	B	HAZLETON/N01-CP-95655
C.I. DIRECT BLUE 218	28407-37-6	CARCINOGENESIS	B	IRDC/N01-CP-05700
C.I. DIRECT YELLOW 11	1325-37-7	CARCINOGENESIS	D	NIEHS
C.I. PIGMENT RED 3	2425-85-6	CARCINOGENESIS	B	SOUTHERN RES. INST.
C.I. PIGMENT RED 23	6471-49-4	CARCINOGENESIS	B	SOUTHERN RES. INST.
COBALT SULFATE HEPTAHYDRATE	10026-24-1	CARCINOGENESIS	B	BATTELLE NORTHWEST
COCONUT OIL ACID (2 PARTS)-DIETHANOLAMINE (1 PART)	68603-42-9	CARCINOGENESIS	B	GULF SOUTH RES. INST.
CODEINE	76-57-3	CARCINOGENESIS	B	MASON RESEARCH INST.
CORN OIL	8001-30-7	CARCINOGENESIS	B	MASON RESEARCH INST.
COUMARIN	91-64-5	CARCINOGENESIS	B	BIOASSAY SYSTEMS
M-CRESOL	108-39-4	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
CRESOL (MIXED ISOMERS)	1319-77-3	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
O-CRESOL	95-48-7	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
P-CRESOL	106-44-5	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
CROTONALDEHYDE	4170-30-3	CARCINOGENESIS	B	LITTON BIONETICS
CUPRIC SULFATE	7758-99-8	CARCINOGENESIS	C	
2,4-DIAMINOPHENOL DIHYDROCHLORIDE	137-09-7	CARCINOGENESIS	B	MASON RES. INST.
4,4'-DIAMINO-2,2'-STILBENEDISULFONIC ACID	81-11-8	CARCINOGENESIS	B	INTERNATIONAL R AND D CORP.
2,3-DIBROMO-1-PROPANOL	96-13-9	CARCINOGENESIS	B	PAPANICOLAOU RES. INST.
DIBUTYL PHTHALATE	84-74-2	CARCINOGENESIS	C	
D AND C YELLOW NO. 11	8003-22-3	CARCINOGENESIS	B	MASON RES. INST.
5,6-DICHLORO-2-BENZOTHIAZOLAMINE	24072-75-1	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOCIATES
1,2-DICHLOROETHANE	107-06-2	CARCINOGENESIS	B	MASON RES. INST.
1,2-DICHLOROETHANE	107-06-2	CARCINOGENESIS	B	MASON RES. INST.
2,4-DICHLOROPHENOL	120-83-2	CARCINOGENESIS	A	BATTELLE-COLUMBUS

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
LONG TERM ANIMAL STUDIES*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
DICHLORVOS	62-73-7	CARCINOGENESIS	A	SOUTHERN RES. INST.
DIETHANOLAMINE	111-42-2	CARCINOGENESIS	B	GULF SOUTH RES. INST.
DIETHANOLAMINE	111-42-2	CARCINOGENESIS	C	BATTELLE-COLUMBUS
DIETHANOLAMINE	111-42-2	CARCINOGENESIS	C	BATTELLE-COLUMBUS
DIETHYL PHTHALATE	84-66-2	CARCINOGENESIS	B	LITTON BIONETICS
3,4-DIHYDROCOUMARIN	119-84-6	CARCINOGENESIS	B	BIOASSAY SYSTEMS
1,2-DIHYDRO-2,2,4-TRIMETHYL-QUINOLINE	147-47-7	CARCINOGENESIS	B	SOUTHERN RES. INST.
DIMETHOXANE	828-00-2	CARCINOGENESIS	B	BATTELLE-COLUMBUS
3,3'-DIMETHOXYBENZIDINE	119-90-4	CARCINOGENESIS	B	HAZLETON/N01-CP-95655
N,N-DIMETHYLANILINE	121-69-7	CARCINOGENESIS	B	SPRINGBORN INST. FOR BIORESEARCH
3,3'-DIMETHYLBENZIDINE	119-93-7	CARCINOGENESIS	B	HAZLETON/N01-CP-95655
DIMETHYL PHTHALATE	131-11-3	CARCINOGENESIS	B	LITTON BIONETICS, INC.
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	CARCINOGENESIS	B	SRI INTERNATIONAL
DMBA	57-97-6			
WITH TPA	41479-14-5	CARCINOGENESIS	B	GULF SOUTH RESEARCH INST.
DMBA/TPA/BPO (7,12-DIETHYL-BENZ(A)ANTH	57-97-6	CARCINOGENESIS	B	BATTELLE-COLUMBUS
EPINEPHRINE HYDROCHLORIDE	55-31-2	CARCINOGENESIS	B	BATTELLE NORTHWEST
1,2-EPOXYHEXADECANE	7320-37-8	CARCINOGENESIS	B	GULF SOUTH RESEARCH INST.
ERYTHROMYCIN STEARATE	643-22-1	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
ETHYL BROMIDE	74-96-4	CARCINOGENESIS	B	BATTELLE NORTHWEST
ETHYL CHLORIDE	75-00-3	CARCINOGENESIS	A	BATTELLE NORTHWEST
ETHYLENE GLYCOL	107-21-1	CARCINOGENESIS	B	SOUTHERN RES. INST./N01-CP-95651
ETHYLENE GLYCOL MONOETHYL ETHER	110-80-5	CARCINOGENESIS	B	GULF SOUTH RESEARCH INST.
ETHYLENE THIOUREA	96-45-7	CARCINOGENESIS	B	BATTELLE-COLUMBUS LAB
FERROCENE	102-54-5	CARCINOGENESIS	C	
FORMIC ACID	64-18-6	CARCINOGENESIS	C	BATTELLE NORTHWEST
FURAN	110-00-9	CARCINOGENESIS	B	SOUTHERN RES. INST.
FURFURAL	98-01-1	CARCINOGENESIS	B	SOUTHERN RES. INST.
FUROSEMIDE	54-31-9	CARCINOGENESIS	B	SRI INTERNATIONAL
GLUTARALDEHYDE	111-30-8	CARCINOGENESIS	B	GULF SOUTH RESEARCH INST.
GLUTARALDEHYDE	111-30-8	CARCINOGENESIS	C	BATTELLE NORTHWEST
GLYCIDOL	556-52-5	CARCINOGENESIS	B	PAPANICOLAOU RES. INST.
GLYCOL(POLYSORBATE 80)	9005-65-6	CARCINOGENESIS	B	SOUTHERN RES. INST.
HC YELLOW 4	52551-67-4	CARCINOGENESIS	B	MASON RES. INST.
HEXACHLOROCYCLOPENTADIENE	77-47-4	CARCINOGENESIS	B	BATTELLE NORTHWEST
HEXACHLOROETHANE	67-72-1	CARCINOGENESIS	B	MASON RES. INST.

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TOXICOLOGY RESEARCH AND TESTING PROGRAM
LONG TERM ANIMAL STUDIES*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
1,6-HEXANEDIAMINE DIHYDROCHLORIDE	6055-52-3	CARCINOGENESIS	B	BATTELLE COLUMBUS
1,6-HEXANEDIAMINE DIHYDROCHLORIDE	6055-52-3	CARCINOGENESIS	C	BATTELLE COLUMBUS
N-HEXANE	110-54-3	CARCINOGENESIS	B	BROOKHAVEN NATIONAL LAB.
HEXYLRESORCINOL	136-77-6	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
HYDROCHLOROTHIAZIDE	58-93-5	CARCINOGENESIS	B	SRI INTERNATIONAL
HYDROQUINONE	123-31-9	CARCINOGENESIS	B	BIOASSAY SYSTEMS
4-HYDROXYACETANILIDE	103-90-2	CARCINOGENESIS	B	MASON RES. INST.
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	CARCINOGENESIS	B	MASON RES. INST.
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	CARCINOGENESIS	B	MASON RES. INST.
IODINATED GLYCEROL	5634-39-9	CARCINOGENESIS	A	MASON RESEARCH INST.
ISOBUTYL NITRITE	542-56-3	CARCINOGENESIS	C	INTERNATIONAL R AND D CORP.
ISOBUTYRALDEHYDE	78-84-2	CARCINOGENESIS	C	HAZLETON LAB.
ISOPRENE	78-79-5	CARCINOGENESIS	C	BATTELLE NORTHWEST
LAURIC ACID DIETHANOLAMINE	120-40-1	CARCINOGENESIS	B	GULF SOUTH RES. INST.
D-LIMONENE	5989-27-5	CARCINOGENESIS	A	MICROBIOLOGICAL ASSOC.
MALONALDEHYDE, SODIUM SALT	24382-04-5	CARCINOGENESIS	A	BATTELLE COLUMBUS
MANGANESE SULFATE MONOHYDRATE	10034-96-5	CARCINOGENESIS	B	BATTELLE COLUMBUS
2-MERCAPTOBENZIMIDAZOLE	583-39-1	CARCINOGENESIS	C	IIT RESEARCH INST.
2-MERCAPTOBENZOTHIAZOLE	149-30-4	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
MERCURIC CHLORIDE	7487-94-7	CARCINOGENESIS	B	INTERNATIONAL R AND D CORP.
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-10-0	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOC.
8-METHOXYPSORALEN	298-81-7	CARCINOGENESIS	B	SRI INTERNATIONAL
ALPHA-METHYLBENZYL ALCOHOL	98-85-1	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOC.
4-(6-METHYL-2-BENZOTHIAZOLYL)-BENZENAMINE	92-36-4	CARCINOGENESIS	B	SOUTHERN RES. INST.
METHYL BROMIDE	74-83-9	CARCINOGENESIS	B	BROOKHAVEN NATL. LABS.
METHYLDOPA	555-30-6	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
METHYLEUGENOL	93-15-2	CARCINOGENESIS	C	
3-METHYL-6-METHOXY-2-AMINO-BENZOTHIAZOLIDINE	NOCAS0884	CARCINOGENESIS	B	MICRIBIOLOGICAL ASSOC.
N-METHYLOLACRYLAMIDE	924-42-5	CARCINOGENESIS	A	BATTELLE-COLUMBUS
METHYLPHENIDATE HC1	298-59-9	CARCINOGENESIS	B	RALTECH/N01-CP-05696
MIREX	2385-85-5	CARCINOGENESIS	A	LITTON-FCRC/N01-CO-75380
MOLYBDENUM TRIOXIDE	1313-27-5	CARCINOGENESIS	B	HAZLETON LABS/N01-ES-28023
MONOCHLOROACETIC ACID	79-11-8	CARCINOGENESIS	B	INTERNATIONAL R AND D CORP.
NALIDIXIC ACID	389-08-2	CARCINOGENESIS	B	PHYSIOLOGICAL RES. LAB.
NAPHTHALENE	91-20-3	CARCINOGENESIS	B	NORTHROP

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
LONG TERM ANIMAL STUDIES*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NICKEL OXIDE	1313-99-1	CARCINOGENESIS	B	LOVELACE RES. INST.
NICKEL SUBSULFIDE	12035-77-3	CARCINOGENESIS	B	LOVELACE RES. INST.
NICKEL SULFATE HEXAHYDRATE	10101-97-0	CARCINOGENESIS	B	LOVELACE RES. INST.
P-NITROANILINE	100-01-6	CARCINOGENESIS	B	SOUTHERN RES. INST.
O-NITROANISOLE	91-23-6	CARCINOGENESIS	B	RALTECH/N01-CP-05776
M-NITROBENZOIC ACID	121-92-6	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOC.
P-NITROBENZOIC ACID	62-23-7	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOC.
NITROFURANTOIN	67-20-9	CARCINOGENESIS	A	SOUTHERN RES. INST.
NITROFURAZONE	59-87-0	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
NITROMETHANE	75-52-5	CARCINOGENESIS	C	
P-NITROPHENOL	100-02-7	CARCINOGENESIS	B	LITTON BIONETICS, INC.
P-NITROTOLUENE	99-99-0	CARCINOGENESIS	D	
OCHRATOXIN A	303-47-9	CARCINOGENESIS	B	BATTELLE-COLUMBUS
OLEIC ACID DIETHANOLAMINE SALT	13961-86-9	CARCINOGENESIS	B	GULF SOUTH RES. INST.
PENICILLIN V POTASSIUM	132-98-9	CARCINOGENESIS	A	SPRINGBORN INST. FOR BIORESEARCH
PENTACHLOROANISOLE	1825-21-4	CARCINOGENESIS	B	SOUTHERN RES. INST.
PENTACHLOROBENZENE	608-93-5	CARCINOGENESIS	B	MASON RES. INST.
PENTACHLOROPHENOL, DOWICIDE EC-7	87-86-5	CARCINOGENESIS	A	BATTELLE COLUMBUS
PENTACHLOROPHENOL, TECHNICAL	87-86-5	CARCINOGENESIS	A	BATTELLE COLUMBUS
PENTAERYTHRITOL TETRANITRATE	78-11-5	CARCINOGENESIS	B	MASON RES. INST.
PHENOLPHTHALEIN	77-09-8	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
PHENYLBUTAZONE	50-33-9	CARCINOGENESIS	B	MASON RESEARCH INST.
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	CARCINOGENESIS	A	BATTELLE COLUMBUS
PHENYTOIN	57-41-0	CARCINOGENESIS	B	BATTELLE COLUMBUS
POLYBROMINATED BIPHENYL (FF-I)	36355-01-8	CARCINOGENESIS	B	BATTELLE-COLUMBUS LAB
PROBENECID	57-66-9	CARCINOGENESIS	B	MASON RES. INST.
PROMETHAZINE HYDROCHLORIDE	58-33-3	CARCINOGENESIS	B	MASON RES. INST.
PYRIDINE	110-86-1	CARCINOGENESIS	B	GULF SOUTH RES. INST.
QUERCETIN	117-39-5	CARCINOGENESIS	B	MASON RES. INST.
RESORCINOL	108-46-3	CARCINOGENESIS	B	INTERNATIONAL R AND D CORP.
RHODAMINE 6G	989-38-8	CARCINOGENESIS	B	SOUTHERN RES. INST.
RIDDELLINE	23246-96-0	CARCINOGENESIS	C	SRI INTERNATIONAL
ROXARSONE	121-19-7	CARCINOGENESIS	A	SOUTHERN RES. INST.
SAFFLOWER OIL	8001-23-8	CARCINOGENESIS	B	MASON RES. INST.
SALICYLAZOSULFAPYRIDINE	599-79-1	CARCINOGENESIS	B	MASON RES. INST.
SCOPOLAMINE HYDROBROMIDE	51-34-3	CARCINOGENESIS	B	SOUTHERN RES. INST.
SODIUM AZIDE	26628-22-8	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOCIATES
SODIUM CYANIDE	143-33-9	CARCINOGENESIS	C	SRI INTERNATIONAL

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
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LONG TERM ANIMAL STUDIES*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
SODIUM DODECYL SULFATE	151-21-3	CARCINOGENESIS	B	GULF SOUTH RES. INST.
SODIUM FLUORIDE	7681-49-4	CARCINOGENESIS	B	BATTELLE COLUMBUS
SODIUM SELENATE	13410-01-0	CARCINOGENESIS	C	
SODIUM SELENITE	10102-18-8	CARCINOGENESIS	C	
SODIUM XYLENE SULFONATE	1300-72-7	CARCINOGENESIS	B	GULF SOUTH RES. INST.
SODIUM XYLENESULFONATE	1300-72-7	CARCINOGENESIS	C	
SUCCINIC ANHYDRIDE	108-30-5	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOC.
TALC	14807-96-6	CARCINOGENESIS	B	LOVELACE RES. INST.
1,2,4,5-TETRACHLOROBENZENE	95-94-3	CARCINOGENESIS	C	MICROBIOLOGICAL ASSOCIATES
TETRACHLOROETHYLENE	127-18-4	CARCINOGENESIS	B	GULF SOUTH RES. INST.
TETRACHLOROPHTHALIC ANHYDRIDE	117-08-8	CARCINOGENESIS	C	MASON RESEARCH INSTITUTE
TETRACYCLINE HYDROCHLORIDE	64-75-5	CARCINOGENESIS	A	PHYSIOLOGICAL RES. LAB.
TETRAFLUOROETHYLENE	116-14-3	CARCINOGENESIS	B	BATTELLE NORTHWEST
1-TRANS-DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	CARCINOGENESIS	B	SRI INTERNATIONAL/N01-ES-28015
TETRAHYDROFURAN	109-99-9	CARCINOGENESIS	C	BATTELLE NORTHWEST
TETRANITROMETHANE	509-14-8	CARCINOGENESIS	B	MIDWEST RES. INST.
THEOPHYLLINE	58-55-9	CARCINOGENESIS	B	SOUTHERN RES. INST.
4,4'-THIOBIS(6-TERT-BUTYL-M-CRESOL)	96-69-5	CARCINOGENESIS	B	BIOASSAY SYSTEMS
THIOPHENE	110-02-1	CARCINOGENESIS	C	BATTELLE-COLUMBUS
TITANIUM FERROCENE	1271-19-8	CARCINOGENESIS	B	MASON RES. INST.
TOLUENE	108-88-3	CARCINOGENESIS	B	INTERNATIONAL R&D CORP.
TRIAMTERENE	396-01-0	CARCINOGENESIS	B	IRDC/N01-CP-05700
TRICAPRYLIN	538-23-8	CARCINOGENESIS	B	MASON RES. INST.
TRICHLORFON	52-68-6	CARCINOGENESIS	B	BATTELLE COLUMBUS
1,1,1-TRICHLOROETHANE	71-55-6	CARCINOGENESIS	B	GULF SOUTH RES. INST.
1,2,3-TRICHLOROPROPANE	96-18-4	CARCINOGENESIS	B	MASON RES. INST.
TRICRESYL PHOSPHATE	1330-78-5	CARCINOGENESIS	B	BATTELLE-COLUMBUS/N01-CP-95653
TRIETHANOLAMINE	102-71-6	CARCINOGENESIS	B	BATTELLE COLUMBUS
TRIETHANOLAMINE	102-71-6	CARCINOGENESIS	B	BATTELLE COLUMBUS
TRIETHANOLAMINE	102-71-6	CARCINOGENESIS	B	BATTELLE COLUMBUS
TRIS(2-CHLOROETHYL) PHOSPHATE	115-96-8	CARCINOGENESIS	B	MICROBIOLOGICAL ASSOCIATES
TUMERIC (CURCUMIN)	8024-37-1	CARCINOGENESIS	B	MASON RES. INST./N01-CP-95619
VINYL CYCLOHEXENE DIOXIDE	106-87-6	CARCINOGENESIS	B	BATTELLE-COLUMBUS
VINYL TOLUENE	25013-15-4	CARCINOGENESIS	B	MIDWEST RES. INST.
WOLLASTONITE CALCIUM SILICATE	13983-17-0	CARCINOGENESIS	B	NIEHS

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
MAMMALIAN MUTAGENESIS - L5178Y MOUSE LYMPHOMA CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETAMINOPHEN	103-90-2	MUTAGENESIS/GENETIC TOXICITY	B	
ACETIC ACID	64-19-7	MUTAGENESIS/GENETIC TOXICITY	B	
ACETOHEXAMIDE	968-81-0	MUTAGENESIS/GENETIC TOXICITY	B	
4-ACETYLAMINOFLUORENE	28322-02-3	MUTAGENESIS/GENETIC TOXICITY	A	
ALLYL GLYCIDYL ETHER	106-92-3	MUTAGENESIS/GENETIC TOXICITY	B	
ALLYL UREA	557-11-9	MUTAGENESIS/GENETIC TOXICITY	B	ALL L5178Y ASSAYS ARE TO BE PERFORMED AT ONE OR BOTH OF THE FOLLOWING ORGANIZATIONS: HAZLETON BIOTECHNOLOGIES CO./N01-ES-28036 INVERESK RES. INTERN./N01-ES-28037
1-AMINO-2,4-DIBROMO-ANTHRAQUINONE	81-49-2	MUTAGENESIS/GENETIC TOXICITY	B	
3-AMINOTRIAZOLE	61-82-5	MUTAGENESIS/GENETIC TOXICITY	A	
AMPHETAMINE SULFATE	60-13-9	MUTAGENESIS/GENETIC TOXICITY	B	
P-ANISIDINE HYDROCHLORIDE	20265-97-8	MUTAGENESIS/GENETIC TOXICITY	A	
5-AZA-2'-DEOXYCYTIDINE	2353-33-5	MUTAGENESIS/GENETIC TOXICITY	B	
O-BENZYL-P-CHLOROPHENOL	120-32-1	MUTAGENESIS/GENETIC TOXICITY	B	
BROMOBENZENE	108-86-1	MUTAGENESIS/GENETIC TOXICITY	B	
1,3-BUTADIENE	106-99-0	MUTAGENESIS/GENETIC TOXICITY	B	
2-(2-BUTOXYETHOXY)ETHYL-THIOCYANATE	112-56-1	MUTAGENESIS/GENETIC TOXICITY	B	
BUTYRIC ACID	107-92-6	MUTAGENESIS/GENETIC TOXICITY	B	
N-BUTYRIC ACID, METHYL ESTER	623-42-7	MUTAGENESIS/GENETIC TOXICITY	B	
GAMMA-BUTYROLACTONE	96-48-0	MUTAGENESIS/GENETIC TOXICITY	B	
CALCIUM CHROMATE	13765-19-0	MUTAGENESIS/GENETIC TOXICITY	A	
CALCIUM CYANAMIDE	156-62-7	MUTAGENESIS/GENETIC TOXICITY	B	
CAPROIC ACID	142-62-1	MUTAGENESIS/GENETIC TOXICITY	B	
CARBROMAL	77-65-6	MUTAGENESIS/GENETIC TOXICITY	B	
D-CARVONE	2244-16-8	MUTAGENESIS/GENETIC TOXICITY	B	
CHLORDECONE (KEPONE)	143-50-0	MUTAGENESIS/GENETIC TOXICITY	B	
CHLOROACETOPHENONE (CN)	532-27-4	MUTAGENESIS/GENETIC TOXICITY	B	
4-(CHLOROACETYL)ACETANILIDE	140-49-8	MUTAGENESIS/GENETIC TOXICITY	B	
M-CHLOROANILINE	108-42-9	MUTAGENESIS/GENETIC TOXICITY	B	
O-CHLOROANILINE	95-51-2	MUTAGENESIS/GENETIC TOXICITY	B	
P-CHLOROANILINE	106-47-8	MUTAGENESIS/GENETIC TOXICITY	A	
CHLOROBENZILATE	510-15-6	MUTAGENESIS/GENETIC TOXICITY	A	
2-CHLOROETHYLTRIMETHYL-AMMONIUM CHLORIDE	999-81-5	MUTAGENESIS/GENETIC TOXICITY	A	
2-CHLOROMETHYLPYRIDINE HYDROCHLORIDE	6959-47-3	MUTAGENESIS/GENETIC TOXICITY	A	

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
MAMMALIAN MUTAGENESIS - L5178Y MOUSE LYMPHOMA CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
3-CHLOROMETHYLPYRIDINE HYDROCHLORIDE	6959-48-4	MUTAGENESIS/GENETIC TOXICITY	A	
2-CHLORO-P-PHENYLENEDIAMINE SULFATE	61702-44-1	MUTAGENESIS/GENETIC TOXICITY	B	
3-CHLORO-P-TOLUIDINE	95-74-9	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. ACID ORANGE 10	1936-15-8	MUTAGENESIS/GENETIC TOXICITY	A	
C.I. ACID ORANGE 3	[illegible]73-74-6	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. ACID RED 114	6459-94-5	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. DIRECT BLUE 218	28407-37-6	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. DIRECT BLUE 15	2429-74-5	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. PIGMENT RED 3	2425-85-6	MUTAGENESIS/GENETIC TOXICITY	B	
C.I. VAT YELLOW 4	128-66-5	MUTAGENESIS/GENETIC TOXICITY	B	
TRANS-CINNAMALDEHYDE	14371-10-9	MUTAGENESIS/GENETIC TOXICITY	B	
CITRIC ACID	77-92-9	MUTAGENESIS/GENETIC TOXICITY	B	
COCONUT DIETHANOLAMIDE	68603-42-9	MUTAGENESIS/GENETIC TOXICITY	A	
COUMAPHOS	56-72-4	MUTAGENESIS/GENETIC TOXICITY	A	
COUMARIN	91-64-5	MUTAGENESIS/GENETIC TOXICITY	B	
CROTONALDEHYDE	4170-30-3	MUTAGENESIS/GENETIC TOXICITY	B	
4,4'-DIAMINO-2,2'-STILBENDE-DIFULFONIC ACID	81-11-8	MUTAGENESIS/GENETIC TOXICITY	B	
DIARYLANILIDE YELLOW	6358-85-6	MUTAGENESIS/GENETIC TOXICITY	B	
DIBENZO-P-DIOXIN	262-12-4	MUTAGENESIS/GENETIC TOXICITY	B	
DIBUTYL PHTHALATE	84-74-2	MUTAGENESIS/GENETIC TOXICITY	B	
P-DICHLOROBENZENE	106-46-7	MUTAGENESIS/GENETIC TOXICITY	A	
5,6-DICHLORO-2-BENZOTHIAZOL-AMINE	24072-75-1	MUTAGENESIS/GENETIC TOXICITY	B	
1,3-DICHLORO-5,5-DIMETHYL-HYDANTOIN	118-52-5	MUTAGENESIS/GENETIC TOXICITY	B	
TRANS-1,2-DICHLOROETHYLENE	156-60-5	MUTAGENESIS/GENETIC TOXICITY	B	
CIS-1,2-DICHLOROETHYLENE	156-59-2	MUTAGENESIS/GENETIC TOXICITY	B	
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	MUTAGENESIS/GENETIC TOXICITY	A	
N,N'-DICYCLOHEXYLTHIOUREA	1212-29-9	MUTAGENESIS/GENETIC TOXICITY	A	
DIETHYL PHTHALATE	84-66-2	MUTAGENESIS/GENETIC TOXICITY	B	
3,4-DIHYDROCOUMARIN	119-84-6	MUTAGENESIS/GENETIC TOXICITY	B	
DIMETHOATE	60-51-5	MUTAGENESIS/GENETIC TOXICITY	B	
DIMETHYL PHTHALATE	131-11-3	MUTAGENESIS/GENETIC TOXICITY	B	
N,N-DIMETHYLUREA	96-31-1	MUTAGENESIS/GENETIC TOXICITY	A	
2,4-DINITROANILINE	97-02-9	MUTAGENESIS/GENETIC TOXICITY	B	

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
MAMMALIAN MUTAGENESIS - L5178Y MOUSE LYMPHOMA CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
2,4-DINITROTOLUENE	121-14-2	MUTAGENESIS/GENETIC TOXICITY	B	
DIOXATHION	78-34-2	MUTAGENESIS/GENETIC TOXICITY	A	
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	MUTAGENESIS/GENETIC TOXICITY	A	
DOXYLAMINE SUCCINATE	562-10-7	MUTAGENESIS/GENETIC TOXICITY	B	
EPINEPHRINE	51-43-4	MUTAGENESIS/GENETIC TOXICITY	B	
1,2-EPOXYBUTANE	106-88-7	MUTAGENESIS/GENETIC TOXICITY	A	
ERYTHROMYCIN STEARATE	643-22-1	MUTAGENESIS/GENETIC TOXICITY	A	
ETHIONAMIDE	536-33-4	MUTAGENESIS/GENETIC TOXICITY	A	
ETHYL BROMIDE	74-96-4	MUTAGENESIS/GENETIC TOXICITY	B	
MONO(2-ETHYLHEXYL)ADIPATE	4337-65-9	MUTAGENESIS/GENETIC TOXICITY	A	
FORMULATED FENAMINOSULF	140-56-7	MUTAGENESIS/GENETIC TOXICITY	B	
5-FLUORO-2'-DEOXYCYTIDINE	10356-76-0	MUTAGENESIS/GENETIC TOXICITY	B	
FORMIC ACID	64-18-6	MUTAGENESIS/GENETIC TOXICITY	B	
GLUTARIC ACID	110-94-1	MUTAGENESIS/GENETIC TOXICITY	B	
HC YELLOW 4	52551-67-4	MUTAGENESIS/GENETIC TOXICITY	B	
HEPTACHLOR	76-44-8	MUTAGENESIS/GENETIC TOXICITY	A	
HEXACHLORO-1,3-BUTADIENE	87-68-3	MUTAGENESIS/GENETIC TOXICITY	B	
HEXACHLOROCYCLOPENTADIENE	77-47-4	MUTAGENESIS/GENETIC TOXICITY	C	
HEXACHLOROETHANE	67-72-1	MUTAGENESIS/GENETIC TOXICITY	A	
N-HEXANE	110-54-3	MUTAGENESIS/GENETIC TOXICITY	B	
IODOFORM	75-47-8	MUTAGENESIS/GENETIC TOXICITY	B	
LAURIC ACID DIETHANOLAMINE CONDENSATE	120-40-1	MUTAGENESIS/GENETIC TOXICITY	A	
LEAD DIMETHYLDITHIOCARBAMATE	19010-66-3	MUTAGENESIS/GENETIC TOXICITY	B	
LINDANE	58-89-9	MUTAGENESIS/GENETIC TOXICITY	B	
MALATHION	121-75-5	MUTAGENESIS/GENETIC TOXICITY	A	
MALONIC ACID	141-82-2	MUTAGENESIS/GENETIC TOXICITY	B	
MANGANESE SULFATE MONOHYDRATE	10034-96-5	MUTAGENESIS/GENETIC TOXICITY	B	
2-MERCAPTOBENZIMIDAZOLE	583-39-1	MUTAGENESIS/GENETIC TOXICITY	A	
MERCAPTOBENZOTHIAZOLE	149-30-4	MUTAGENESIS/GENETIC TOXICITY	A	
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-60-0	MUTAGENESIS/GENETIC TOXICITY	A	
8-METHOXYPSORALEN	298-81-7	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL ACETATE	79-20-9	MUTAGENESIS/GENETIC TOXICITY	B	
4-(6-METHYL-2-BENZOTHIAZOLYL)-BENZENAMINE	92-36-4	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL CAPROATE	106-70-7	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL CARBAMATE	598-55-0	MUTAGENESIS/GENETIC TOXICITY	A	
METHYLDOPA	555-30-6	MUTAGENESIS/GENETIC TOXICITY	A	

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
MAMMALIAN MUTAGENESIS - L5178Y MOUSE LYMPHOMA CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
METHYL FORMATE	107-31-3	MUTAGENESIS/GENETIC TOXICITY	B	
N-METHYLOLACRYLAMIDE	924-42-5	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL PARATHION	298-00-0	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL STEARATE	112-61-8	MUTAGENESIS/GENETIC TOXICITY	B	
METHYL VALERATE	624-24-8	MUTAGENESIS/GENETIC TOXICITY	B	
MOLYBDENUM TRIOXIDE	1313-27-5	MUTAGENESIS/GENETIC TOXICITY	A	
MONO(2-ETHYLHEXYL)PHTHALATE	4376-20-9	MUTAGENESIS/GENETIC TOXICITY	B	
MONURON	150-68-5	MUTAGENESIS/GENETIC TOXICITY	A	
N-(1-NAPHTHYL)ETHYLENEDIAMINE DIHYDROCHLORIDE	1465-25-4	MUTAGENESIS/GENETIC TOXICITY	B	
4-NITROANTHRANILIC ACID	619-17-0	MUTAGENESIS/GENETIC TOXICITY	B	
P-NITROPHENOL	100-02-7	MUTAGENESIS/GENETIC TOXICITY	B	
N-NITROSODIETHANOLAMINE	1116-54-7	MUTAGENESIS/GENETIC TOXICITY	B	
P-NITROTOLUENE	99-99-0	MUTAGENESIS/GENETIC TOXICITY	A	
OLEIC ACID DIETHANOLAMINE	13961-86-9	MUTAGENESIS/GENETIC TOXICITY	A	
OXALIC ACID	144-62-7	MUTAGENESIS/GENETIC TOXICITY	B	
OXYTETRACYCLINE HYDROCHLORIDE	2058-46-0	MUTAGENESIS/GENETIC TOXICITY	A	
PENTACHLOROPHENOL DOWICIDE EC-7	87-86-5	MUTAGENESIS/GENETIC TOXICITY	B	
PHENACETIN	62-44-2	MUTAGENESIS/GENETIC TOXICITY	A	
PHENFORMIN HYDROCHLORIDE	834-28-6	MUTAGENESIS/GENETIC TOXICITY	B	
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	MUTAGENESIS/GENETIC TOXICITY	B	
N-PHENYL-P-PHENYLENEDIAMINE	101-54-2	MUTAGENESIS/GENETIC TOXICITY	B	
1-PHENYL-2-THIOUREA	103-85-5	MUTAGENESIS/GENETIC TOXICITY	B	
PHENYTOIN (DIPHENYLHYDANTOIN)	57-41-0	MUTAGENESIS/GENETIC TOXICITY	B	
PHTHALIC ANHYDRIDE	85-44-9	MUTAGENESIS/GENETIC TOXICITY	A	
POLYSORBATE 80 (GLYCOL)	9005-65-6	MUTAGENESIS/GENETIC TOXICITY	B	
POTASSIUM FLUORIDE	7789-23-3	MUTAGENESIS/GENETIC TOXICITY	A	
PROBENECID	57-66-9	MUTAGENESIS/GENETIC TOXICITY	B	
PROMETHAZINE HYDROCHLORIDE	58-33-3	MUTAGENESIS/GENETIC TOXICITY	B	
PROPIONIC ACID	79-09-4	MUTAGENESIS/GENETIC TOXICITY	B	
PROPIONIC ACID, METHYL ESTER	554-12-1	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYLENE	115-07-1	MUTAGENESIS/GENETIC TOXICITY	B	
PROPYLENE OXIDE	75-56-9	MUTAGENESIS/GENETIC TOXICITY	B	
PYRILAMINE MALEATE	59-33-6	MUTAGENESIS/GENETIC TOXICITY	B	
QUERCETIN	117-39-5	MUTAGENESIS/GENETIC TOXICITY	B	
SEBACIC ACID	111-20-6	MUTAGENESIS/GENETIC TOXICITY	B	
SODIUM AZIDE	26628-22-8	MUTAGENESIS/GENETIC TOXICITY	B	
SODIUM FLUORIDE	7681-49-4	MUTAGENESIS/GENETIC TOXICITY	A	
SODIUM XYLENESULFONATE	1300-72-7	MUTAGENESIS/GENETIC TOXICITY	A	

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NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
TOXICOLOGY RESEARCH AND TESTING PROGRAM
MAMMALIAN MUTAGENESIS - L5178Y MOUSE LYMPHOMA CELLS*

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
STEARIC ACID	57-11-4	MUTAGENESIS/GENETIC TOXICITY	B	
SUCCINIC ACID	110-15-6	MUTAGENESIS/GENETIC TOXICITY	B	
SUCCINIC ACID 2,2-DIMETHYLHYDRAZIDE	1596-84-5	MUTAGENESIS/GENETIC TOXICITY	A	
SUCCINIC ANHYDRIDE	108-30-5	MUTAGENESIS/GENETIC TOXICITY	B	
SUCROSE	57-50-1	MUTAGENESIS/GENETIC TOXICITY	A	
SULFAMETHAZINE	57-68-1	MUTAGENESIS/GENETIC TOXICITY	B	
3-SULFOLENE	77-79-2	MUTAGENESIS/GENETIC TOXICITY	B	
TALC	14807-96-6	MUTAGENESIS/GENETIC TOXICITY	B	
1,1,2,2-TETRACHLOROETHANE	79-34-5	MUTAGENESIS/GENETIC TOXICITY	A	
TITANOCENE DICHLORIDE	1271-19-8	MUTAGENESIS/GENETIC TOXICITY	B	
TOLAZAMIDE	1156-19-0	MUTAGENESIS/GENETIC TOXICITY	B	
TOLBUTAMIDE	64-77-7	MUTAGENESIS/GENETIC TOXICITY	B	
TOLUENE	108-88-3	MUTAGENESIS/GENETIC TOXICITY	A	
2,5-TOLUENEDIAMINE SULFATE	6369-59-1	MUTAGENESIS/GENETIC TOXICITY	B	
TRIAMTERENE	396-01-0	MUTAGENESIS/GENETIC TOXICITY	B	
TRIPELENNAMINE HYDROCHLORIDE	154-69-8	MUTAGENESIS/GENETIC TOXICITY	B	
TRIS(2-CHLOROETHYL) PHOSPHATE	115-96-8	MUTAGENESIS/GENETIC TOXICITY	B	
L-TRYPTOPHAN	73-22-3	MUTAGENESIS/GENETIC TOXICITY	B	
TURMERIC OLEORESIN (CURCUMIN)	8024-37-1	MUTAGENESIS/GENETIC TOXICITY	B	
N-VALERIC ACID	109-52-4	MUTAGENESIS/GENETIC TOXICITY	B	
VINYLIDENE CHLORIDE (1,1-DICHLOROETHYLENE	75-35-4	MUTAGENESIS/GENETIC TOXICITY	A	
WOLLASTONITE CALCIUM SILICATES	13983-17-0	MUTAGENESIS/GENETIC TOXICITY	B	

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TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
CENTER FOR FOOD SAFETY AND APPLIED NUTRITION

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETOETHYLTETRAMETHYLTETRALIN		DERMAL TOXICITY	A	DIV. TOXICOL./10162
ACETOETHYLTETRAMETHYLTETRALIN		SYSTEMIC/ORGAN TOXICITY	A	DIV. TOXICOL./10162
AFLATOXIN	1402-68-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	C	DIV. TOXICOL./09596
AFLATOXIN	1402-68-2	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	EPIDEMIOL. UNIT
ANTHRACENE	120-12-7	SYSTEMIC/ORGAN TOXICITY	A	DIV. TOXICOL./08980
ASCORBIC ACID	50-81-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	B	DIV. NUTRITION/PMS NO. 09487
CADMIUM	7440-43-9	NUTRITIONAL STUDIES/PHARMACOKINETCS/ METABOLISM	B	DIV. NUTRITION/00384
CADMIUM CHLORIDE	10108-64-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. TOXICOL./09596
CADMIUM METALLOTHIONEN		ACUTE/CHRONIC TOXICITY	A	DIV. TOXICOL./00022
CAFFEINE	58-08-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	C	DIV. TOXICOL./09596
CAFFEINE	58-08-2	IMMUNOLOGIC TOXICITY	A	DIV. TOXICOL./11198
CHOLESTEROL OXIDES		PHARMACOKINETICS/METABOLISM/ BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	D	DIV. NUTRITION/00373
CITRININ	518-75-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	D	DIV. TOXICOL./09596
COMFREY ROOT, DOMESTIC		SUBCHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	A	DIV. TOXICOL./09596
COPPER		IMMUNOLOGIC TOXICITY/NUTRITIONAL STUDIES	C	DIV. NUTRITION/11778
D AND C ORANGE 5			A	DIVISION OF TOXICOLOGY/10162
D AND C RED 9	5160-02-1		B	DIVISION OF TOXICOLOGY/10162
DIOXANE	123-91-1	SYSTEMIC/ORGAN TOXICITY	A	DIV. TOXICOL./10162
TRANS FATTY ACIDS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	D	DIV. NUTRITION/00373
FD AND C RED NO. 40	25956-17-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. TOXICOL./09684
FD AND C YELLOW NO. 5	1934-21-0	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. TOXICOL./09687
GLUTARALDEHYDE	111-30-8	SUBCHRONIC TOXICITY	A	DIV. TOXICOL./08399
HEAT STABLE TOXIN OF E. COLI		GENETIC TOXICITY	B	LITTON BIONETICS FOR DM/223-80-2295
MANGANESE	7439-96-5	NUTRITIONAL STUDIES PHARMACOKINETICS/METABOLISM	B	DIV. NUTRITION/PMS NO. 09847
5-METHOXYPSORALEN	484-20-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIVISION OF TOXICOLOGY/11756
8-METHOXYPSORALEN	298-81-7	PHOTOTOXICITY	B	DIV. TOXICOL./10162
8-METHOXYPSORALEN	298-81-7	OCULAR TOXICITY	A	DIV. TOXICOL./11290
METHYL XANTHINES		IMMUNOLOGIC TOXICITY	A	DIVISION OF TOXICOLOGY/11198
N-NITROSO-N-METHYLDODECYLAMINE	75356-79-5	DERMAL TOXICITY	B	DIVISION OF TOXOCOLOGY/10162

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194

TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
CENTER FOR FOOD SAFETY AND APPLIED NUTRITION

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
N-NITROSO-N-METHYLOCTADECYLAMINE		DERMAL TOXICITY	B	DIVISION OF TOXICOLOGY/10162
PBB'S		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	MICH. DEPT. PUB. HLTH.
PSORALEN	66-97-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		/11756
SACCHARIN	81-07-2	ACUTE/CHRONIC TOXICITY	A	DIV. TOXICOL./08355
SELENIUM	7782-49-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		
		PHARMACOKINETICS/METABOLISM		
		SUBCHRONIC TOXICITY	B	DIV. NUTRITION/PMS NO. 09847
STAPHYLOCOCCAL ENTEROTOXINS		IMMUNOLOGIC TOXICITY	B	DIV. MICROBIOL./11778
TENUAZONIC ACID		IMMUNOLOGIC TOXICITY	B	DIV. MICROBIOLOGY/127049
TRIMETHYL-PSORALEN	3902-71-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	/11756
VITAMIN E		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		
		SUBCHRONIC TOXICITY		
		NUTRITIONAL STUDIES	A	DIV. NUTRITION/09847
VOMITOXIN	17924-92-4	BIOCHEMICAL EFFECTS (IN VITRO)	D	DIV. TOXICOL.
ZEARALENONE	17924-92-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. TOXICOL./09596

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0195

TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
CENTER FOR VETERINARY MEDICINE

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
SULFAMETHAZINE	57-68-1	ACUTE/CHRONIC TOXICITY	A	NCTR

TEST STATUS CODE: A = TEST TO BE COMPLETED IN FY 1987 - B = ON TEST IN FY 1987
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FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETAMINOPHEN	103-90-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY/CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 6098, 6232
ACETAMINOPHEN	103-90-2	PHARMACOKINETICS/METABOLISM BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6298/6435
ACETAMINOPHEN	103-90-2	ANALYTICAL CHEMISTRY	B	DIV. BIOCHEM. TOX./EXP. 6435
ACETOLAMIDE		SYSTEMIC/ORGAN TOXICITY/CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 318
N-ACETOXY-2-ACETYLAMINOFLUORENE	6098-44-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 341
N-ACETOXY-N-ACETYL-1-AMINOPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187
N-ACETOXY-AMINOFLUORENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX.
N-ACETOXY-AMINOFLUORENE		CARCINOGENESIS	B	DIV. GENETIC TOX.
N-ACETOXY-N-TRIFLUOROACETYL-4--AMINOBIPHENYL		IMMUNOLOGIC TOXICITY	B	DIV. GENETIC TOX.
N-ACETYL-2-AMINOFLUORENE	53-96-3	CARCINOGENESIS	B	DIV. CHEMISTRY/EXP. 6012
2-ACETYLAMINOFLUORENE	53-96-3	NUTRITIONAL STUDIES	B	DIV. COMP. TOX./EXP. 346
2-ACETYLAMINOFLUORENE	53-96-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	DIV. COMP. TOX.
2-ACETYLAMINOFLUORENE	53-96-3	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 160
2-ACETYLAMINOFLUORENE	53-96-3	CARCINOGENESIS	B	DIV. BIOCHEM. TOX.
2-ACETYLAMINOFLUORENE	53-96-3	CARCINOGENESIS	B	DIV. COMP. TOX./EXP. 328
(3H)-N-ACETYL-2-AMINOFLUORENE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/387
N-ACETYL-1-AMINOPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX.
N-ACETYLBENZIDINE	3366-61-8	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
N-ACETYL-P-BENZOQUINONEIMINE	50700-49-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6098/6232
N-ACETYL-N-HYDROXY-2-AMINOFLUORENE	30651-40-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. COMP. TOX./EXP. 186
N-ACETYL-N-HYDROXY-1-AMINOPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6131
N4-ACETYLSULFAMETHAZINE	100-90-3	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6285
N4-ACETYLSULFAMETHAZINE	100-90-3	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6285
ACTINOMYCIN D	50-76-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP.641 IAG USDA/EXP 940-943
ALLYL CHLORIDE	107-05-1	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	INVERESK RES. INT., LTD.
6-AMINOBENZO(A)PYRENE	7428-83-3	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 275/276
(3H)4-AMINOBIPHENYL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/387
4-AMINOBIPHENYL	92-67-1	IMMUNOLOGIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 211
4-AMINOBIPHENYL	92-67-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6397
6-AMINOCHRYSENE	2642-98-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6387

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TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
2-AMINOFLUORENE	153-78-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6400
1-AMINOPYRENE	1606-67-3	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6191/6187
(3H)-1-AMINOPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187
3-AMINOPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187
6-AMINOPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187
8-AMINOPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187
AMPHETAMINE	300-62-9	NEUROLOGIC/BEHAVIORAL TOXICITY	B	DIV. REPROD. DEVEL. TOX./6326
AROCHLOR 1254	11097-69-1	CARCINOGENESIS	B	DIV. REPROD. DEVEL. TOX./BIOCHEM. TOX./ EXP. 6187/6420/6429
BENZANTHRACENE	56-55-3	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 275
BENZIDINE	92-87-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211
BENZO(A)PYRENE	50-32-8	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 160
BENZO(A)PYRENE	50-32-8	METABOLISM/ENZYMOLOGY	B	DIV. COMPAR. TOX.
BENZO(A)PYRENE	50-32-8	CARCINOGENESIS	B	DIV. GENETIC TOX./EXP. 160/275
N-BENZOYLOXY-N-METHYL-4-AMINOBENZENE		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 210
N-BUTYL ACETATE	123-86-4	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	DIV. REPROD. DEVEL. TOX./CONTRACT NOT AWARDED
N-BUTYL ACRYLATE	141-32-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	D	RES. TRI. INST./N01-ES6-2127
CHLOROWAX 40	63449-39-8	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	
CHLOROWAX 500C	63449-39-8	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	C	
*1,8-CINEOLE	470-82-6	CHRONIC TOXICITY/CARCINOGENICITY	B	DIV. COMP. TOX./EXP. 380/389/439/440
*1,8-CINEOLE	470-82-6	CHRONIC TOXICITY/CARCINOGENICITY	A	DIV. COMP. TOX./EXP. 372
*1,8-CINEOLE	470-82-6	PHARMACOKINETICS/METABOLISM	D	DIV. COMP. TOX./EXP. 372
*CINNAMALDEHYDE	104-55-2	CHRONIC TOXICITY/CARCINOGENICITY	B	DIV. COMP. TOX./EXP. 381,390
*CINNAMALDEHYDE	104-55-2	PHARMACOKINETICS/METABOLISM	B	DIV. CHEMISTRY/EXP. 6055
CLONIDINE		NEUROLOGIC/BEHAVIORAL TOXICITY	A	DIV. REPROD. DEVEL. TOX./6341
4-(DEOXYADENOSIN-6-YL)4-AMINOBIPHENYL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/6397
4-(DEOXYADENOSIN-6-YL)-2-NAPHTHYLAMINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/6397
3-(DEOXYGUANOSINE-N2-YL)-2-ACETYLAMINOFLUORENE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/6407/6421
N-(DEOXYGUANOSINE-8-YL)-2-ACETYLAMINOFLUORENE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/6012/ 6358/6407/6421/6353/6397
N-(DEOXYGUANOSINE-8-YL)-4-AMINOBIPHENYL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/6308/6397

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TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

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N-(DEOXYGUANOSINE-8-YL)-2-AMINOFLUORENE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211/6012/6358/6407/6421/6353
N-(DEOXYGUANOSINE-8-YL)-1-AMINOPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6407/6420/6429
1-DEUTERO-NAPHTHALENE		PHARMACOKINETICS/METABOLISM	A	DIV. MICROBIOLOGY/EXP. 6001
DEXAMETHASONE	50-02-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. REPROD. DEVEL. TOX./EXP. 6065
DEXAMETHASONE	50-02-2	CARCINOGENESIS	B	DIV. REPROD. DEVEL. TOX./EXP. 6065
DEXAMETHASONE	50-02-2	NEUROLOGIC/BEHAVIORAL TOXICITY	B	DIV. REPROD. DEVEL. TOX./6398
DIBROMOETHANE	106-93-4	MUTAGENESIS/GENETIC TOXICITY	A	DIV. GENETIC TOX./EXP. 6314
1,3-DI((N-(4,6-DIMETHYL-2-PYRIMIDINYL)-4-SULFAMOYLPHENYL))		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP 6149
DIETHYLSTILBESTROL	56-53-1	CHRONIC TOXICITY	A	DIV. COMP. TOX./EXP. 035
DIMETHOXYBENZIDINE	119-90-4	ACUTE/CHRONIC TOXICITY	A	DIV. COMP. TOX./EXP. 088
N,N-DIMETHYL-4-AMINOBENZENE		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 210
2-(DIMETHYLAMINOETHYLAMINO)PYRIDINE	23826-72-4	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 210
DIMETHYLBENZANTHRACENE	57-97-6	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 275
DIMETHYLBENZANTHRACENE	57-97-6	PHARMACOKINETICS/METABOLISM	B	DIV. COMP. TOX.
DIMETHYLBENZANTHRACENE	57-97-6	CARCINOGENESIS	B	DIV. GENETIC TOX./EXP. 276
3,3'-DIMETHYLBENZIDINE	119-93-7	CARCINOGENESIS	A	DIV. COMP. TOX./EXP. 090
DIMETHYLFORMAMIDE	68-12-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	INVERESK RES. INT., LTD.
N-(2,2-DIMETHYL-HYDROXYETHYL)-4-METHYLBENZAMIDE		PHARMACOKINETICS/METABOLISM	B	DIV. DEVELOP. TOX./EXP. 275
DIMETHYLNITROSAMINE	62-75-9	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 160/6068
DINITROPYRENE		CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 6420/6429
1,3-DINITROPYRENE	75321-20-9	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
1,6-DINITROPYRENE	42397-64-8	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
1,8-DINITROPYRENE	42397-65-9	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
(3H)-1,3-DINITROPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
(3H)-1,6-DINITROPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
(3H)-1,8-DINITROPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
DIPHENYLHYDANTOIN	57-41-0	IMMUNOLOGIC TOXICITY	A	DIV. BIOCHEM. TOX./EXP. 272
DIPHENYLHYDANTOIN	57-41-0	CARCINOGENESIS	A	DIV. BIOCHEM. TOX./EXP. 272
DIPHENYLHYDANTOIN	57-41-0	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. BIOCHEM. TOX./EXP. 272

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1,3-DI(4-SULFAMOYLPHENYL)TRIAZINE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. COMP. TOX./EXP. 6149
*DOXYLAMINE	469-21-6	PHARMACOKINETICS/METABOLISM	B	DIV. CHEMISTRY/EXP. 6039/6273
*DOXYLAMINE	469-21-6	TERATOGENESIS/ PHARMACOKINETICS/METABOLISM	A	DIV. REPROD. DEVEL. TOX./EXP. 6126
*DOXYLAMINE	469-21-6	METABOLIC PROFILE	B	DIV. CHEMISTRY/EXP. 6273
*DOXYLAMINE (14-C)	469-21-6	PHARMACOKINETICS/METABOLISM	B	DIV. CHEMISTRY/EXP. 6262
ESTRADIOL	50-28-2	PHARMACOKINETICS/METABOLISM	B	DIV. REPROD. DEVEL. TOX./EXP. 170
ESTRADIOL	50-28-2	CHRONIC TOXICITY	A	DIV. COMP. TOX./EXP. 344
ESTRADIOL	50-28-2	PHARMACOKINETICS/METABOLISM	A	DIV. COMP. TOX./EXP. 6079
ETHYLENE GLYCOL	107-21-1	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. REPROD. DEVEL. TOX./6130
ETHYLTHMIDYL(3'-5')DEOXYADENOSINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 318
ETHYLTHYMIDYL(3'-5')DEOXYCYTIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 318
7-FLUROBENZANTHRACENE-TRANS--5,6-DIHYDRODIOL			B	DIV. BIOCHEM. TOX./EXP. 276
8-(N-FLUOREN-2-YLACETAMIDO)-2'-DEOXYGUANOSINE 5'-MONOPHOSPHATE	14490-86-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. BIOCHEM. TOX./EXP. 6012/6358
8-(N-FLUOREN-2-YLAMINO)-2'-DEOXYGUANOSINE 5'-MONOPHOSPHATE	17660-46-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. BIOCHEM. TOX./EXP. 6012/6358
5-FLUOROURACIL	51-28-8	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. REPROD. DEVEL. TOX./6130
N-FORMYL-N-HYDROXY-2-AMINOFLUORENE	67176-33-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. COMP. TOX./EXP. 186/6124/6125
GENTIAN VIOLET	548-62-9	ACUTE/CHRONIC TOXICITY	A	DIV. COMP. TOX/ EXP 278/279/304/338/354/355
GENTIAN VIOLET	548-62-9	CARCINOGENESIS	A	DIV. BIOCHEM. TOX./ EXP. 263/264/360/361/362/6121
GENTIAN VIOLET	548-62-9	PHARMACOKINETICS/METABOLISM	A	DIV. COMP. TOX./EXP. 259/302/303/6040
N-(GUANOSINE-8-YL)-4-AMINOBIPHENYL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 211/6358
HC-BLUE-NO. 1	2784-94-3	MUTAGENESIS/GENETIC TOXICITY	A	DIV. GENETIC TOX./EXP. 6097
N-HYDROXYACETAMINOPHEN	63975-21-3	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6098
N-HYDROXY-2-ACETYLAMINOFLUORENE	53-95-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6029/159
N-HYDROXY-2-ACETYLAMINOFLUORENE	53-95-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. COMP. TOX./EXP. 6124/6125
N-HYDROXY-N-ACETYL-2-AMINOFLUORENE	30651-40-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. BIOCHEM. TOX./EXP. 211/6012

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FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

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N-HYDROXY-N-ACETYL-2-AMINO-FLUORENE		CARCINOGENESIS	A	DIV. COMP. TOX./EXP. 186/6124/6125/6353
N-HYDROXY-1-ACETYLAMINOPYRENE		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6182
N-HYDROXY-N-ACETYLBENZIDINE	71609-25-1	CARCINOGENESIS/MUTAGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211/6289
N'-HYDROXY-N-ACETYLBENZIDINE	71609-23-9	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
N-HYDROXY-4-AMINOBIPHENYL	6810-26-0	CARCINOGENESIS/MUTAGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211/6289
N-HYDROXY-6-AMINOCHRYSENE		CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 6387
N-HYDROXY-AMINOFLUORENE	53-94-1	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 160/6289
N-HYDROXY-AMINOFLUORENE	53-94-1	CARCINOGENESIS	C	DIV. GENETIC TOX./EXP. 6408
N-HYDROXY-2-AMINOFLUORENE	53-94-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 211
N-HYDROXY-1-AMINOPYRENE		BIOCHEMICAL/TISSUE/CELLULAR EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6121/6187/6407/6420/6429
N-HYDROXY-N-FORMYL-2-AMINO-FLUORENE		CARCINOGENESIS	A	DIV. BIOCHEM. TOX./EXP. 186
N-HYDROXY-1-NAPHTHYLAMINE	607-30-7	CARCINOGENESIS	B	DIV. BIOCHEM. TOX. EXP. 283/264/360/361/362/363
N-HYDROXY-1-NAPHTHYLAMINE	607-30-7	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
N-HYDROXY-2-NAPHTHYLAMINE	613-47-8	CARCINOGENESIS	B	DIV. BIOCHEM. TOX. EXP. 283/264/360/361/362/363
N-HYDROXY-2-NAPHTHYLAMINE	613-47-8	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
(3H)-N-HYDROXY-1-NAPHTHYLAMINE		SYSTEMIC/ORGAN TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 211/387
(3H)N-HYDROXY-2-NAPHTHYLAMINE		SYSTEMIC/ORGAN TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 211/387
N-HYDROXYPHENACETIN	19315-64-1	PHARMACOKINETICS/METABOLISM MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6098
N-HYDROXY-P-PHENETIDINE	19315-64-1	PHARMACOKINETICS/METABOLISM MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6098
N-HYDROXY-N-PROPIONYL-2-AMINOFLUORENE		CARCINOGENESIS/BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. COMP. TOX./EXP. 186
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TYPE II, DIISOPROPYLCARBOIIMIDE AS STABILIZER)	107-44-88	SUBCHRONIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL/TOXICITY	B	PATHOLOGY (CONTRACT)/EXP. 478-483
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TYPE I, TRIBUTYLAMINE AS STABILIZER)	107-44-88	SUBCHRONIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	PATHOLOGY (CONTRACT) EXP. 472-477
LINDANE	58-89-9	IMMUNOLOGIC TOXICITY	C	DIV. BIOCHEM. TOX./EXP. 189
LINDANE	58-89-9	IMMUNOLOGIC TOXICITY	A	DIV. BIOCHEM. TOX./EXP. 189
LINDANE	58-89-9	ACUTE/CHRONIC TOXICITY	A	DIV. COMP. TOX./EXP. 228
LOFEXIDINE		NEUROLOGIC/BEHAVIORAL TOXICITY	A	DIV. REPROD. DEVEL. TOX./EXP. 6341

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2-(P-METHOXYBENZYLAMINO)-PYRIDINE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX.
3-METHYLADENINE	5142-23-4	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 318
7-METHYLADENINE	935-69-3	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 318
N-METHYL-4-AMINOAZOBENZENE	621-90-9	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 360/362/2107
7-METHYLBENZO(A)PYRENE	63041-77-0	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 276
METHYL MERCURIC CHLORIDE	115-09-3	NEUROLOGIC/BEHAVIORAL TOXICITY	C	NCTR/NIOSH CONTRACTS/U. OF MISS. 22-81-2
METHYL METHANESULFONATE	66-27-3	MUTAGENESIS/GENETIC TOXICITY	B	DIV. GENETIC TOX./EXP. 160/604
METHYL METHANESULFONATE	66-27-3	CARCINOGENESIS	B	DIV. GENETIC TOX./EXP. 160/604
METHYL METHANESULFONATE	66-27-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 160
N-METHYL-N-NITROSOUREA	684-93-5	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 448
N-METHYLSULFAMETHAZINE		PHARMACOKINETICS/METABOLISM	B	DIV. CHEMISTRY/EXP. 6005
3-METHYLTHYMIDINE	958-74-7	PHARMACOKINETICS/METABOLISM	A	DIV. BIOCHEM. TOX./EXP. 318
METHYLTHYMIDYLYL(3'-5')THYMIDINE		PHARMACOKINETICS/METABOLISM	A	DIV. BIOCHEM. TOX./EXP. 6029/159
1-NAPHTHYLAMINE	134-32-7	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 211
2-NAPHTHYLAMINE	91-59-8	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
(3H)1-NAPHTHYLAMINE		SYSTEMIC/ORGAN TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 211/387
(3H)2-NAPHTHYLAMINE		SYSTEMIC/ORGAN TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 211/387
1,2-NAPTHALENEDIHYDRODIOL	7234-04-0		B	DIV. BIOCHEM. TOX./EXP. 276
6-NITROBENZO(A)PYRENE	63041-90-7	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 275/276
6-NITROBENZO(A)PYRENE	63041-90-7	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 275/276
6-NITROBENZO(A)PYRENE	63041-90-7	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 275/276
(3H)4-NITROBIPHENYL		SYSTEMIC/ORGAN TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 211/387
4-NITROBIPHENYL	92-93-3	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
6-NITROCHRYSENE	7496-02-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6387/275
2-NITROFLUORENE	607-57-8	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
1-NITRONAPHTHALENE	86-57-7	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 211
P-NITROPHENOL	100-02-7	ACUTE/CHRONIC TOXICITY	A	PATHOLOGY(CONTRACT)/EXP. 5062
4-NITROPHENYLHYDROXYLAMINE	16169-16-7	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX.
1-NITROPYRENE	5522-43-0	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 275/6191/6187/6407/6420/6429
1-NITROPYRENE	5522-43-0	ANALYTICAL CHEMISTRY	A	DIV. BIOCHEM. TOX./EXP. 6290
(3H)-1-NITROPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6191/6187/6407/6420/6429
1-NITROPYRENE-CIS-4,5-DIHYDRODIOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187

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0202

TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
1,NITROPYRENE-TRANS-4,5-DIHYDRODIOL		ANALYTICAL CHEMISTRY	A	DIV. BIOCHEM. TOX./EXP. 6290/6420/6429
1-NITROPYRENE-TRANS-4,5-DIHYDRODIOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187
3-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
4-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
5-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
6-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
8-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
9-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
10-NITROPYRENOL		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6187/6420/6429
NITROSAMINE IN PACIFIERS: COMPLIANCE TESTING		ANALYTICAL CHEMISTRY	B	DIV. CHEMISTRY/EXP. 6210 CPSC/NCTR IAG 224-82-0007 MOD. 2
NITROSAMINES IN PACIFIERS: COLLABORATION OF NCTR				
4'-NITROSO-N-ACETYL-4-AMINOBIPHENYL		CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 159/211
4-NITROSOBIPHENYL	10125-76-5	CARCINOGENESIS		DIV. BIOCHEM. TOX./EXP. 159/211
1-NITROSONAPHTHALENE	21711-65-9	CARCINOGENESIS	B	DIV. BIOCHEM. TOX./EXP. 159/211
P-NITROSOPHENETOLE	3420-97-1	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6098
1-NITROSOPYRENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6187/6289/6407/6420/6429
NITROUS OXIDE	10024-97-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. REPROD. DEVEL. TOX./EXP 6396
OXAMIDE	471-46-5	SYSTEMIC/ORGAN TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 318
PARAOXON	311-45-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6094
PARAOXON	311-45-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. COMP. TOX./EXP. 6124/6125/186
PENICILLAMINE HYDROCHLORIDE	2219-30-9	CHEMISTRY METHODS	A	DIV. CHEMISTRY/EXP. 6283

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FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
PENTAMETHYLPARAROSANILINE	603-47-4	PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 259
PENTAMETHYLPARAROSANILINE	603-47-4	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 259
PHENACETIN-D2		PHARMACOKINETICS/METABOLISM		DIV. BIOCHEM. TOX./EXP. 6098
PHENOBARBITAL	50-06-6	PHARMACOKINETICS/METABOLISM	A	DIV. CHEMISTRY/DIV. BIOCHEM. TOX.
3'-PHOSPHOADENOSINE-5'-PHOSPHOSULFATE		PHARMACOKINETICS/METABOLISM	B	DIV. BIOCHEM. TOX./EXP. 6094
PINACOLYL METHYLPHOSPHONOFLUORIDATE (SOMAN)	96-64-0	SUBCHRONIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	PATHOLOGY (CONTRACT)/EXP. 484-489
POLYDIMETHYLSILOXANE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. REPROD. DEVEL. TOX./EXP. 453/6291
PROGESTERONE	57-83-0	PHARMACOKINETICS/METABOLISM	A	DIV. REPROD. DEVEL. TOX./EXP. 6065
PROPANIL	709-98-8	MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 6386
		PHARMACOKINETICS/METABOLISM		
N-PROPIONYL-N-HYDROXY-2-AMINOFLUORENE	52663-84-0	DNA BINDING/METABOLISM		DIV. BIOCHEM. TOX./EXP. 6124/6125
PYRILAMINE	91-84-9	PHARMACOKINETICS/METABOLISM	B	DIV. COMP. TOX./EXP. 6039
*PYRILAMINE MALEATE	91-84-9	CHRONIC TOXICITY/CARCINOGENESIS	C	DIV. COMP. TOX./EXP. 408/409
PYRILAMINE	91-84-9	MUTAGENESIS/GENETIC TOXICITY	A	DIV. GENETIC TOX.
PYRILAMINE	91-84-9	ANALYTICAL CHEMISTRY	A	DIV. BIOCHEM. TOX./EXP. 6039
PYRILAMINE	91-84-9	METABOLIC PROFILE	B	DIV. CHEMISTRY/EXP. 6273
PYRILAMINE	91-84-9	IMMUNOTOXICOLOGY	B	DIV. COMP. TOX./DIV. BIOCHEM. TOX./ EXP. 6287
RESERPINE	50-55-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	DIV. REPROD. DEVEL. TOX./EXP. 6326
RETINOIC ACID	302-79-4	BEHAVIOR/TERATOLOGY	A	DIV. REPROD. DEVEL. TOX./EXP. 6320
SACCHARIN	81-07-2	ACUTE/CHRONIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 258/448
SACCHARIN	81-07-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6094/6091
TAMOXIFEN		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	DIV. REPROD. DEVEL. TOX./EXP. 460
SACCHARIN	81-07-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DIV. BIOCHEM. TOX./EXP. 6229
SULFAMETHAZINE	57-68-1	CHRONIC TOXICITY		
		PHARMACOKINETICS/METABOLISM		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIV. COMP. TOX./DIV. REPROD. DEVEL. TOX./ EXP 418/419/333/334/420/421/422/423
SULFAMETHAZINE	57-68-1	CARCINOGENESIS	B	DIV. COMP. TOX. EXP. 283/264/360/361/362/363
SULFAMETHAZINE	57-68-1	ACUTE/CHRONIC TOXICITY	B	DIV. COMP. TOX./EXP. 418/419
SULFAMETHAZINE	57-68-1	CARCINOGENESIS	B	DIV. COMP. TOX./EXP. 418/419
SULFAMETHAZINE	57-68-1	PHARMACOKINETICS/METABOLISM	B	DIV. COMP. TOX./EXP. 6005/347/348
SULFAMETHAZINE	57-68-1	PHARMACOKINETICS/METABOLISM	A	DIV. CHEMISTRY/EXP. 6005
SULFAMETHAZINE-N4-GLUCOSIDE		PHARMACOKINETICS/METABOLISM	B	DIV. COMP. TOX./EXP. 6005/347/348
SULFAMETHAZINE-N4-GLUCURONIDE		PHARMACOKINETICS/METABOLISM	B	DIV. COMP. TOX./EXP. 6005/347/348

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TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
SULFAMETHAZINE TRIAZENE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. COMP. TOX./EXP. 6149
TESTOSTERONE	58-22-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	DIV. REPROD. DEVEL. TOX./EXP. 6065
TETRAHYDROCANNABINOL	1972-08-3	NEUROLOGIC/BEHAVIORAL TOXICITY	B	Div. REPROD. DEVEL. TOX./EXP. 6230/6342
N,N,N',N'-TETRAMETHYLPARAROSANILINE		MUTAGENESIS/GENETIC TOXICITY	B	DIV. BIOCHEM. TOX./EXP. 259
TRIMETHYLTIN	56-24-6	PHARMACOKINETICS/METABOLISM	B	DIV. REPROD. DEVEL. TOX./EXP. 6305/6385
TRIPROLIDINE HCL	6138-79-0	CARCINOGENESIS	B	DIV. COMP. TOX./EXP. 414/415
TRIPROLIDINE	6138-79-0	MICROBIAL METABOLISM	B	DIV. CHEM./EXP. 6419

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TOXICOLOGY TESTING

FOOD AND DRUG ADMINISTRATION
CENTER FOR DRUGS AND BIOLOGICS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ALUMINUM	7429-90-5	BEHAVIORAL TOXICITY	A	DIVISION OF DRUG BIOLOGY
AMPHETAMINE	300-62-9	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	A	DIVISION OF DRUG BIOLOGY
DAUNORUBICIN	20830-81-3	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
DAUNORUBICIN	20830-81-3	MUTAGENESIS/GENETIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
DOXORUBICIN	23214-92-8	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
DOXORUBICIN	23214-92-8	MUTAGENESIS/GENETIC TOXICITY	A	DIVISION OF DRUG BIOLOGY
EPHEDRINE	299-42-3	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	A	DIVISION OF DRUG BIOLOGY
GENTAMYCIN	1403-66-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIVISION OF DRUG BIOLOGY
GOLD SODIUM THIOMALATE	39377-38-3	IMMUNOLOGIC TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
GOLDTHIOMALATE	39377-38-3	IMMUNOLOGIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	DIVISION OF DRUG BIOLOGY
HYDRALAZINE	86-54-4	SYSTEMIC/ORGAN TOXICITY	B	DIVISION OF DRUG BIOLOGY
HYDRALAZINE	86-54-4	IMMUNOLOGIC TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
ISOPROTERENOL	7683-59-2	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
ISOPROTERENOL	7683-59-2	SYSTEMIC/ORGAN TOXICITY	B	DIVISION OF DRUG BIOLOGY
6-MERCAPTOPURINE	6112-76-1	REPRODUCTIVE/DEVELOPMENTAL TOXICITY/ SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
6-MERCAPTOPURINE	6112-76-1	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	DIVISION OF DRUG BIOLOGY
MERCURIC CHLORIDE	7487-94-7	IMMUNOLOGIC TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
MERCURIC CHLORIDE	7487-94-7	IMMUNOLOGIC TOXICITY		
METHYLDOPA	555-30-6	IMMUNOLOGIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	DIVISION OF DRUG BIOLOGY
METHYLDOPA	555-30-6	IMMUNOLOGIC TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
MINOXIDIL	38304-91-5	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
NITROFURANTOIN	67-20-9	IMMUNOLOGIC TOXICITY SUBCHRONIC TOXICITY	A	DIVISION OF DRUG BIOLOGY
NITROFURANTOIN	67-20-9	SYSTEMIC/ORGAN TOXICITY	A	DIVISION OF DRUG BIOLOGY

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FOOD AND DRUG ADMINISTRATION
CENTER FOR DRUGS AND BIOLOGICS

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
D-PENICILLAMINE	52-67-5	IMMUNOLOGIC TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	B	DIVISION OF DRUG BIOLOGY
PENTOBARBITAL		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIVISION OF DRUG BIOLOGY
PHENOBARBITAL	50-06-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIVISION OF DRUG BIOLOGY
PHENYLPROPANOLAMINE	14838-15-4	SYSTEMIC/ORGANIC TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
PHENYLPROPANOLAMINE	14838-15-4	ACUTE/CHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
		SYSTEMIC/ORGAN TOXICITY		
PHENYTOIN	57-41-0	REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
PHENYTOIN	57-41-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	DIVISION OF DRUG BIOLOGY
PRACTOLOL	6673-35-4	IMMUNOLOGIC TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
PROCAINAMIDE	51-06-9	IMMUNOLOGIC TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
PROCAINAMIDE	51-06-9	IMMUNOLOGIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
PROPRANOLOL	525-66-6	IMMUNOLOGIC TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
PROPRANOLOL		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIVISION OF DRUG BIOLOGY
SALICYLATES		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	DIVISION OF DRUG BIOLOGY
TERBUTALINE	23031-25-6	SYSTEMIC/ORGAN TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY
VERAPAMIL	52-53-9	SYSTEMIC/ORGAN TOXICITY		
		SUBCHRONIC TOXICITY	B	DIVISION OF DRUG BIOLOGY

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TOXICOLOGY TESTING

CENTERS FOR DISEASE CONTROL
NIOSH
DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
*TERT-BUTANOL	75-65-0	BEHAVIORAL TERATOLOGY	A	NEURO. RES. SECT., DBBS/VOB CAN276
*CHRYSOTILE	12000-29-5	MESOTHELIOMA	C	EXP. PATH. SECT., DBBS/VOT BAB376
*CHRYSOTILE(MODIFIED)		MESOTHELIOMA	C	EXP. PATH. SECT., DBBS/VOT BAB376
*CHRYSOTILE(MODIFIED)		MESOTHELIOMA	C	EXP. PATH. SECT., DBBS/VOT BAB376
*CROCIDOLITE	12001-28-4	MESOTHELIOMA	C	EXP. PATH. SECT., DBBS/VOT BAB376
*1-DECANOL	112-30-1	STANDARD TERATOLOGY	A	NEURO. RES. SECT., DBBS/VOB CAN276
*METHYL ETHYL KETONE	78-93-3	BEHAVIORAL TOXICITY	A	NEURO. RES. SECT., DBBS/VOB BHB 272
*METHYL ISOBUTYL KETONE	108-10-1	BEHAVIORAL TOXICITY	A	NEURO. RES. SECT., DBBS/VOB CHY 272
*1-NONANOL	143-08-8	STANDARD TERATOLOGY	A	NEURO. RES. SECT., DBBS/VOB BGB276
*1-OCTANOL	111-87-5	STANDARD TERATOLOGY	A	NEURO. RES. SECT., DBBS/VOB BGB276
*VANADIUM PENTOXIDE		PULMONARY SENSITIZATION	A	CHRON. TOX. SECT., DBBS/VOO BCB327

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR POPULATION RESEARCH
REPRODUCTIVE SCIENCES BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ALCOHOL, CAFFEINE, DRUGS		CHRONIC TOXICITY, REPRODUCTIVE/ DEVELOPMENTAL TOXICITY	B	FRED HUTCHINSON CANCER RES. CTR/R2321528
CLOMID		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	UNIV. OF CALIF. SAN FRANCISCO/R01-17491
CLOMIPHENE CITRATE		CHRONIC TOXICITY	B	VANDERBILT UNIV./R01-19498
DIETHYLSTILBESTROL	56-53-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	UNIV. OF CALIF. SAN FRANCISCO/R01-17491
ENVIRONMENTAL AGENTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	YALE UNIV./R01-16282
GONADATROPIC RELEASING HORMONE ANALOGS		ACUTE/CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	SALK INST. FOR BIOLOGICAL STUDIES P01HD13527
GONADOTROPIC RELEASING HORMONE (38 ANALOGS)		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	UNIV. OF CALIF., SAN DIEGO/5R01HD14084-04
LHRH ANALOGUES		CHRONIC TOXICITY, REPRODUCTIVE/ DEVELOPMENTAL TOXICITY	B	MASSACHUSETTS GENERAL HOSP./R0121204
LITHIUM		REPRODUCTIVE/DEVELOPMENTAL TOXICITY SUBCHRONIC TOXICITY	B	UNIV. OF TEXAS/R01-17677
TAMOXIFEN		CHRONIC TOXICITY	B	VANDERBILT UNIV./R01-19498

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR POPULATION RESEARCH
CONTRACEPTIVE DEVELOPMENT BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
N-BUTYLCYCLOHEXANE CARBOXYLIC ACID		REPRODUCTIVE/DEVELOPMENTAL TOXICITY SUBCHRONIC TOXICITY	A	MASON RESEARCH INSTITUTE/N01-52934
LEVONORGESTREL		PHARMACOKINETICS/METABOLISM	B	UNIV. OF CALIF., SAN FRANCISCO/N01-62829
LHRH ANTAGONISTS		REPRODUCTIVE/DEVELOPMENTAL TOXICITY SUBCHRONIC TOXICITY	B	HARBOR UCCA MED. CTR./N01-62928

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR POPULATION RESEARCH
CONTRACEPTIVE EVALUATION BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
CONTRACEPTIVE ESTROGENS AND PROGESTINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	JOHNS HOPKINS UNIV./N01-32816
CONTRACEPTIVE STEROIDS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF MISSOURI/N01-52909
MONOGLUTAMIC FOLATE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY NUTRITIONAL STUDIES	B	UNIV. OF ALABAMA/N01-52927
ORAL CONTRACEPTIVES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY NUTRITIONAL STUDIES CHRONIC TOXICITY	B	UNIV. OF ALABAMA/N01-52927
ORAL CONTRACEPTIVES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY, REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	UNIFORMED SERVICES UNIV. OF THE HLTH. SCI./ Y01 61204
ORAL CONTRACEPTIVES		CHRONIC TOXICITY, IMMUNOLOGIC TOXICOLOGY	B	UNIV. OF WASHINGTON, N01-62914

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NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR RESEARCH FOR MOTHERS AND CHILDREN
MENTAL RETARDATION AND DEVELOPMENT DISABILITIES BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
CLONIDINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY NEUROLOGIC/BEHAVIORAL TOXICITY	B	YALE UNIV.,NEW HAVEN, CONN./ P01 03008(013)
DEBRISOQUINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY NEUROLOGIC/BEHAVIORAL TOXICITY	B	YALE UNIV.,NEW HAVEN, CONN./ P01 03008(014)
FENFLURAMINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY NUTRITIONAL STUDIES	B	YALE UNIV.,NEW HAVEN, CONN./ P01 03008(009)
FOLATE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY NUTRITIONAL STUDIES		YALE UNIV.,NEW HAVEN, CONN./ P01 03008(011)
LEAD	7439-92-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY NEUROLOGIC/BEHAVIORAL TOXICITY	B	CHILDREN'S HOSPITAL CORP., BOSTON, MASS./R01-20381
LEAD	7459-92-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	CHILDREN'S HOSPITAL CORP. BOSTON,/ P30 1-8655(019)
METHYLPHENIDATE	113-45-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY NEUROLOGICAL/BEHAVIORAL TOXICITY	B	YALE UNIV.,NEW HAVEN, CONN./ P01 03008(015)
SODIUM BENZOATE PHENYLACETATE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	JOHNS HOPKINS UNIV., BALTIMORE, MD/R01-11134

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR RESEARCH FOR MOTHERS AND CHILDREN
PREGNANCY AND PERINATOLOGY BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
BUPROPION		REPRODUCTIVE/DEVELOPMENTAL TOXICITY SUBCHRONIC TOXICITY	B	UNIV. OF FLORIDA; GAINESVILLE, FLA./ R01-14075
DESIPRAMINE	56-47-5	REPRODUCTIVE/DEVELOPMENTAL TOXICITY SUBCHRONIC TOXICITY	B	UNIV. OF FLORIDA; GAINESVILLE, FLA./ R01-14075
2-HYDROXY-BUPROPION		REPRODUCTIVE/DEVELOPMENTAL TOXICITY SUBCHRONIC TOXICITY	B	UNIV. OF FLORIDA; GAINESVILLE, FLA./ R01-14075
NICOTINE	54-11-5	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	COLUMBIA UNIV. NEW YORK, NY P50 13063(013)
RITODRINE		CHRONIC TOXICITY/CLINICAL TOXICITY	B	NORTHWESTERN MEMORIAL HOSPITAL, CHICAGO, IL U01-21363
RITODRINE		CHRONIC TOXICITY/CLINICAL TOXICITY	B	MAGEE-WOMANS HOSPITAL, PITTSBURGH, PA U01-21410
VALPROIC ACID	99-66-1	CHRONIC TOXICITY NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF WASHINGTON, SEATTLE, WASH. R01-20156

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR RESEARCH FOR MOTHERS AND CHILDREN
GENETICS AND TERATOLOGY BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETOZOLAMIDE CARBON DIOXIDE ETHANOL		SYSTEMIC/ORGAN TOXICITY	B	CHILDREN'S HOSPITAL MEDICAL CENTER CINCINNATI, OH./R01 19260
CAFFEINE	58-08-2	MUTAGENESIS/GENETIC TOXICITY	B	UNIV. OF COLORADO, DENVER, CO./ P01 02000(007)
RETINOIC ACID AND ANALOGS		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	THOMAS JEFFERSON UNIV., PHILADELPHIA, PA./ R01 20925
RETINOIDS		CHRONIC TOXICITY NUTRITIONAL STUDIES	B	CALIFORNIA PUBLIC HEALTH FDN.; BERKLEY, CA./ R01-21399

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NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
CENTER FOR RESEARCH FOR MOTHERS AND CHILDREN
ENDOCRINOLOGY, NUTRITION AND GROWTH BRANCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
P-BROMOPHENYLACETYLUREA		NUTRITIONAL STUDIES		
		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF MINN., ST. PAUL, MINN./R01-20111
LHRH ANALOGS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	MASSACHUSETTS GEN. HOSP., BOSTON, MA./ R01-18169
METHYL MERCURY	22967-92-6	NUTRITIONAL STUDIES		
		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF MINN., ST. PAUL, MINN./R01-20111
TRIMETHYLTIN		NUTRITIONAL STUDIES		
		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF MINN., ST. PAUL, MINN./R01-20111

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0215

TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
HEART AND VASCULAR DISEASES PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ADRIAMYCIN	23214-92-8	CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF MARYLAND/R01-HL32615
ALIPHATIC NITRILES		CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	B	DARTMOUTH COLLEGE/R01HL14127
ALLYLAMINE (ALIPHATIC AMINES)	107-11-9	PHARMACOKINETICS/METABOLISM BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF TEXAS, GALVESTON/ R01HL26189
ANTHRACYCLINE ADRIAMYCIN	23214-92-8	CHRONIC TOXICITY	B	JOHNS HOPKINS UNIV./R01-HL35079
CYANIDE		CHRONIC TOXICITY MUTAGENESIS/GENETIC TOXICITY	B	DARTMOUTH COLLEGE/R01 HL-14127
CYCLOHEXAMINE	2201-15-2	SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF TEXAS, GALVESTON/ R01HL26189
DIGITALIS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	BRIGHAM AND WOMEN'S HOSPITAL/R01-HL36141
DIGITALIS		SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CHICAGO/R01 HL-30724
ETHANOL	64-17-5	PHARMACOKINETICS/METABOLISM REPRODUCTIVE/DEVELOPMENTAL TOXICITY SYSTEMIC/ORGAN TOXICITY	B	CHILDRENS HOSP. NATL. MEDICAL LAB./ R01 HL-30231
LIPOPROTEIN LIPOPHILIC CARCINOGENS POLYNUCLEAR AROMATIC HYDROCARBONS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS	B	TEXAS A AND M UNIV./R01-HL31973
NITRILES		CHRONIC TOXICITY MUTAGENESIS/GENETIC TOXICITY	B	DARTMOUTH COLLEGE/R01 HL-14127
NITROPRUSSIDE	13755-38-9	CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	B	DARTMOUTH COLLEGE/R01HL14127
NITROPRUSSIDE	15078-28-1	CHRONIC TOXICITY MUTAGENESIS/GENETIC TOXICITY	B	DARTMOUTH COLLEGE/R01 HL-14127
OUABAIN DIGITALIS	630-60-4	CHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	A	TEXAS A & M UNIV./R01-HL34131

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TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
HEART AND VASCULAR DISEASES PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
PHENYLALKYL AMINES		CHRONIC TOXICITY CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF SOUTH CAROLINA P01 HL-27430-01
RADIOGRAPHIC CONTRAST MATERIAL		CHRONIC TOXICITY SYSTEMIC ORGAN TOXICITY	B	BETH ISRAEL HOSPITAL/R01 HL-32620
TETRODOTOXIN	4368-28-9	CHRONIC TOXICITY CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF NORTH CAROLINA/ P01 HL-27430
TOBACCO SMOKE COMPONENTS		CHRONIC TOXICITY PHARMACOKINETICS/METABOLISM	B	NAYLOR DANA INST./R01-HL 32204
VERAPAMIL	52-53-9	CHRONIC TOXICITY CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF NORTH CAROLINA/ P01 HL-27430

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TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
LUNG DISEASES PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACROLEIN	107-02-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIV. OF VERMONT/P50 HL14212
ACROLEIN	107-02-8	CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIV. OF FLORIDA/R23 HL-29407
ADRIAMYCIN	23214-92-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIVERSITY OF MIAMI/R01 HL-26029
AEROSOLS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
ASBESTOS	1332-21-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
AUTOMOBILE EXHAUST		PHARMACOKINETICS/METABOLISM PULMONARY TOXICITY	B	LOUISIANA STATE UNIVERSITY/R01 HL-25820
BERYLLIUM	7440-41-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIV. OF VERMONT/P50HL14212
BLEOMYCIN	11056-06-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIVERSITY OF MIAMI/R01 HL-26029
CHLORINE GAS	7782-50-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
COFFEE DUST		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
COTTON DUST		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
CYCLOPHOSPHAMIDE (TOXIC METABOLITES)	50-18-0	CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	C	UNIV. OF FLORIDA/R23 HL-29407

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TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
LUNG DISEASES PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
KAOLIN	1332-58-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
KAOLIN	1332-58-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIV. OF VERMONT/P50HL14212
MONOCROTALINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	D	MICHIGAN STATE UNIVERSITY/R01 HL-32244
NITROFURANTOIN	67-20-9	SYSTEMIC/ORGAN TOXICITY PULMONARY TOXICITY	D	UNIVERSITY OF BRITISH COLUMBIA/ ROL HL-32082
NITROFURANTOIN	67-20-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIVERSITY OF MIAMI/R01 HL-26029
NITROFURANTOIN	67-20-9	PULMONARY TOXICITY	B	EAST TENNESSEE STATE UNIVERSITY/ R01-HL34725
NITROGEN DIOXIDE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LOUISIANA STATE UNIVERSITY/R01 HL-16029
OXYGEN	7782-44-7	PULMONARY TOXICITY BIOCHEMISTRY/TISSUE/CELLULAR EFFECTS	B	CHILDREN'S HOSPITAL OF LOS ANGELES/ R01 HL-37556
OXYGEN	7782-44-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIVERSITY OF MIAMI/R01 HL-26029
OXYGEN	7782-44-7	PULMONARY TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	JOHNS HOPKINS UNIV./R01 HL-34674
OXYGEN	7782-44-7	PULMONARY TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	NEW YORK MEDICAL COLLEGE/R01-HL-34688
OZONE	10028-15-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	LOUISIANA STATE UNIV./R01 HL-16029
OZONE	10028-15-6	BIOCHEMICAL/TISSUE/CELLULAR EFFECTS	D	SUNY AT STONY BROOK/R01 HL-31429
PARAQUAT	4685-14-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIVERSITY OF MIAMI/R01 HL-26029
PEROXIDES		BIOCHEMICAL/TISSUE/CELLULAR EFFECTS PULMONARY TOXICITY	D	UNIVERSITY OF BRITISH COLUMBIA/ R01 HL-32082
PHOSPHORAMIDE		CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIV. OF FLORIDA/R23 HL-29407
POLYAMINES MONOCROTALINE		PULMONARY TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF KENTUCKY/R01 HL-36404

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TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
LUNG DISEASES PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
RESPIRATORY SYSTEM TOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	D	MEDICAL COLLEGE OF GEORGIA/R01 HL-31422
SILICA	7631-86-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092
SILICA	7631-86-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	UNIV. OF VERMONT/P50HL14212
TOBACCO SMOKE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	LOUISIANA STATE UNIV./R01 HL-25820
TOBACCO SMOKE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY	B	CHANNING LABORATORY/R01 HL-36474
TOLUENE DIISOCYANATE	26471-62-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY EPIDEMIOLOGY	B	TULANE UNIV./P50HL15092

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TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
BLOOD DISEASES AND RESOURCES PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETOPHENETIDIN	62-44-2	PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	C	MEDICAL UNIV. OF SOUTH CAROLINA/ R01 HL-30038
ANILINE DAPSONE		SYSTEMIC/ORGAN TOXICITY PHARMACOKINETICS/METABOLISM	B	MEDICAL UNIV. OF SOUTH CAROLINA/ R01 HL-30038
ANTISICKLING AGENTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY CHRONIC TOXICITY	B	UNIV. OF PITTSBURGH/R01-HL32793
PHENYLAMINES		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	MEDICAL UNIV. OF SOUTH CAROLINA/ R01 HL-30038
QUININE, QUINIDINE	56-54-2	CLINICAL TOXICOLOGY/EPIDEMIOLOGY CHRONIC TOXICITY	A	UNIV. OF MINNESOTA/R23-HL35948

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TOXICOLOGY TESTING

NATIONAL HEART, LUNG AND BLOOD INSTITUTE
INTRAMURAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ADRIAMYCIN	23214-92-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. OF CHEMICAL PHARMACOLOGY-DRUG TISSUE INTERACTION SECTION/Z01-HL00958
ADRIAMYCIN	23214-92-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. OF CHEMICAL PHARMACOLOGY-DRUG TISSUE INTERACTION SECTION/Z01-HL00977
BENZYL ALCOHOL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03854
BILIRUBIN	635-65-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. OF BIOCHEMISTRY/Z01HL00237
DAUNOMYCIN	20830-81-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. OF CHEMICAL PHARMCOLOGY-DRUG TISSUE INTERACTION SECTION/Z01-HL00958
DAUNOMYCIN	20830-81-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. OF CHEMICAL PHARMACOLOGY-DRUG TISSUE INTERACTION SECTION/Z01-HL00977
DAUNOMYCIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03862
DOXORUBICIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03853
DOXORUBICIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03857
DOXORUBICIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03860
HALOTHANE	151-67-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LABORATORY OF CHEMICAL PHARMACOLOGY Z01 HL-00962-02
MINOXIDIL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03849
MONENSIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03826
1-MPTP METHAMPHETAMINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	HYPERTENSION-ENDOCRINE BRANCH/ Z01 HL-03546
PARAQUAT		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PATHOLOGY BRANCH/Z01 HL-03856
PERTUSSIS TOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LABORATORY OF CELLULAR METABOLISM/ Z01 HL-00625

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETAMINOPHEN	103-90-2	PHARMACOKINETICS/METABOLISM BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF WASHINGTON/1R01DK30699
ACRYLAMIDE	79-06-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY NEUROLOGIC/BEHAVIORAL TOXICITY	B	WASHINGTON UNIVERSITY/K04-DK01516
ALLOPUMILIOTOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIADDK)/Z01AM31100
AMINOGLYCOSIDE ANTIBIOTICS		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	SUNY-STONYBROOK/R01DK27061
AMINOGLYCOSIDE ANTIBIOTICS		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIV. OF CALIFORNIA SAN DIEGO/R01DK32159
AMINOGLYCOSIDE ANTIBIOTICS		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	NORTH CAROLINA STATE UNIVERSITY RALEIGH R01DK31862
ANALGESICS		PHARMACOKINETICS/METABOLISM SUBCHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	NIH (NIDDK)/Z01AM19200
ANESTHETICS		SYSTEMIC/ORGAN TOXICITY	B	UNIV. OF ARIZONA/R01DK16715
ANTITRYPANOSOMAL COMPOUNDS		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY	B	NIH(NIDDK)/Z01AM19239
APPETITE SUPPRESSANTS		NUTRITIONAL STUDIES NEUROLOGIC BEHAVIORAL TOXICITY PHARMACOKINETICS METABOLISM SUBCHRONIC TOXICITY	B	ANVER BIOSCIENCE DESIGN, INC./R43DK37209
BACTERIAL ENDOTOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	NIH (NIDDK)/Z01AM23960
BAPIVACAINE	2180-92-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31100
BARBITURATES		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	NIH (NIDDK)/Z01AM53501
BATRACHOTOXININ A	19457-37-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31100

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0223

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
BENZ(C)ACRIDINE	225-51-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS MUTAGENESIS/GENETIC TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31104
BENZANTHRACENE	56-55-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS MUTAGENESIS/GENETIC TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31104
BENZODIAZEPINE		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	NIH (NIDDK)/Z01AM53501
BENZO(A)PYRENE	50-32-8	CARCINOGENESIS	B	NIH (NIDDK)/Z01AM24640
BENZO(A)PYRENE	50-32-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS MUTAGENESIS/GENETIC TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31104
BENZOIC ACID	65-85-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	B	UNIV. OF RHODE ISLAND/R01DK33536
BROMOBENZENE	108-86-1	SYSTEMIC/ORGAN TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	THOMAS JEFFERSON UNIVERSITY/R01DK38305
CARBON TETRACHLORIDE	56-23-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETCS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO R01DK19843
CARCINOGENS		CARCINOGENESIS	B	NIH (NIDDK)/Z01AM24640
CHOLERA TOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	NIH (NIDDK)/Z01AM23960
CHOLERA TOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	ANTWERP STATE UNIV. CENTER/R01DK32136
DIBROMOCHLOROPROPANE	96-12-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO R01DK19843
N-(3,5-DICHLOROPHENYL) SUCCINIMIDE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	MARSHALL UNIVERSITY/R01DK31210

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
4-(3',4'-DIHYDROXYPHENYL)-PYRIDINE		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM19249
DIMETHYLNITROSAMINE	62-75-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF CALIFORNIA, SAN FRANSISCO R01DK19843
ENFLUREANE	13838-16-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF ARIZONA/R01DK16715
EPICHLOROHYDRIN	106-89-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO R01AM19843
ETHIONINE	13073-35-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO R01AM19843
ETHYLENE DIBROMIDE	106-93-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO R01AM19843
6-FLUOROBENZO(A)PYRENE		CARCINOGENESIS	B	NIH (NIDDK)/Z01AM24640
FORMALDEHYDE	50-00-0	CARCINOGENESIS	B	NIH (NIDDK)/Z01AM24640
FUROSEMIDE	54-31-99	CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM SUBCHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	INDIANA UNIVERSITY SCHOOL OF MEDICINE/ R01DK37994
GALACTOSAMINE	7535-00-44	SYSTEMIC/ORGAN TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	THOMAS JEFFERSON UNIVERSITY/R01DK38305
GENTAMICIN	1403-66-3	SYSTEMIC/ORGAN TOXICITY	B	SUNY-STONYBROOK/R01DK27061
GENTAMICIN	1403-66-3	SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF MICHIGAN-ANN ARBOR R01DK30879
GENTAMICIN	1403-66-3	PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	C	NORTH CAROLINA STATE UNIVERSITY, RALEIGH R01DK31862

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
GEPHYROTOXIN	55893-12-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31100
HALOTHANE	151-67-7	SYSTEMIC/ORGAN TOXICITY	B	UNIV. OF ARIZONA/R01DK16715
HISTRIONICOTOXIN	34685-67-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31100
IPRONIAZID	54-92-22	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY PHARMACOKINETICS/METABOLISM, BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF WASHINGTON/R01DK30699
IRON	7439-89-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NUTRITIONAL STUDIES	C	CORNELL UNIVERSITY, ITHACA/R23DK33058
IRON CHELATES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM	B	FOOD AND DRUG RESEARCH LABS, INC./ N01AM42255
LIPOPOLYSACCHARIDE (E. COLI ENDOTOXIN)		IMMUNOLOGIC TOXICITY, SYSTEMIC ORGAN TOXICITY	B	NIH(NIDDK)Z01AM43215
MEMBRANE ATTACK COMPLEX		IMMUNOLOGIC TOXICITY	B	NEW YORK MEDICAL COLLEGE/K08DK01778
MERCURIC CHLORIDE	7487-94-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF MICHIGAN AT ANN ARBOR R01DK30879
METHYLCHOLANTHRENE	56-49-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO R01DK19843
1-METHYL-4-PHENYL-1,2,3,6-TETRAHYDROPYRIDINE(MPTP)		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM19249
MPTP N-OXIDE		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM19249
MUTAGENIC AGENTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY MUTAGENESIS/GENETIC TOXICITY	B	NIH (NIDDK)/Z01AM21008
NEPHROTOXINS		IMMUNOLOGIC TOXICITY	B	UNIVERSITY OF WASHINGTON/K08DK01398
NEPHROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS, PHARMACOKINETICS/METABOLISM SYSTEMIC ORGAN TOXICITY	B	MARSHALL UNIVERSITY/R01DK31210

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NETILMICIN	56311-56-1	BIOCHEMICAL/CELLULAR TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	STATE UNIVERSITY NEW YORK STONY BROOK R01DK27061
NEUROTOXINS		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM19401
OCHRATOXIN A	303-47-9	CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	CASE WESTERN RESERVE UNIV./R01DK27987
PERHYDROHISTRIONICOTOXIN	40709-29-33	NEUROLOGIC/BEHAVIORAL TOXICITY	D	NIH(NIDDK)/Z01AM19247
PHALLOIDIN(E)	17466-45-4	SYSTEMIC/ORGAN TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	THOMAS JEFFERSON UNIV./R01DK38305
PHENOBARBITAL	50-06-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA, SAN FRANCISCO/R01DK19843
PHENYLHYDRAZINES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA SAN DIEGO/ R01DK14982
CIS-PLATINUM	15663-27-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	MOUNT SINAI SCHOOL OF MEDICINE/ K08DK01381
CIS-PLATINUM	15663-27-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF MICHIGAN-ANN ARBOR R01DK30879
POLYCYCLIC HYDROCARBONS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS MUTAGENESIS/GENETIC TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31104
PUMILIOTOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM31100
RICIN	9009-86-3	CLINICAL TOXICOLOGY/EPIDEMIOLOGY CARCINOGENESIS REPRODUCTIVE/DEVELOPMENTAL TOXICITY	D	MEMORIAL HOSPITAL FOR CANCER AND ALLIED DISEASES/ R01DK34762
STREPTOZOTOCIN	18883-66-4	CLINICAL TOXICOLOGY/EPIDEMIOLOGY NEUROLOGIC/BEHAVIORAL TOXICITY	B	WASHINGTON UNIVERSITY/K04DK01516

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NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
STREPTOZOTOCIN	18883-66-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF MASSACHUSETTS MEDICAL SCH./ R01DK25306
STREPTOZOTOCIN	18883-66-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	SOUTHERN ILLINOIS UNIV. AT EDWARDSVILLE, IL./ R23DK32389
STREPTOZOTOCIN	18883-66-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF MEDICINE AND DENTISTRY OF NJ/R01DK32447
STREPTOZOTOCIN	18883-66-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	WASHINGTON UNIVERSITY/R23DK33629
SUCCINIMIDES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	MARSHALL UNIVERSITY/R01DK31210
THIOACETAMIDE	62-55-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA SAN FRANCISCO, CA./ R01DK19843
THIOCOLCHICINE	2730-71-4	PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM19216
THIOCOLCHICINE ANALOGS		PHARMACOKINETICS/METABOLISM	B	NIH (NIDDK)/Z01AM19216
TOBRAMYCIN	32986-56-4	SYSTEMIC/ORGAN TOXICITY	B	SUNY-STONYBROOK/R01DK27061
TOXIN B (CLOSTRIDIUM)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY HOSPITAL (BOSTON)/R01DK34583
VALPROIC ACID (DIPROPYLACETIC ACID)	99-66-1	SYSTEMIC/ORGAN TOXICITY SUBCHRONIC TOXICITY PHARMACOKINETICS/METABOLISM BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNVERSITY OF WASHINGTON/R01DK30699
VINYLIDENE CHLORIDE	75-35-4	SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF TEXAS MED BR GALVESTON/ R01DK34806

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACYCLOVIR	59277-89-3	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF ALABAMA/N01-AI-62532
ACYCLOVIR	59277-89-3	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF ALABAMA/N01-AI-62554
ACYCLOUIR+DERIVATIVES	59277-89-3	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF UTAH/N01-AI-62518
ADENINE ARABINOSIDE (ARA-A)	5536-17-4	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF ALABAMA/N01-AI-62554
ADENINE ARABINOSIDE (ARA-A)	5536-17-4	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF UTAH/N01-AI-62518
S-ADENOSYL-L-METHIONINE ANALOGS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	SOUTHERN RESEARCH INSTITUTE/N01-AI-42555
5'-AMINOTHYMIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF WISCONSIN/R01-AI-19043-06
ANSIOMYCIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	COLORADO STATE UNIV./N01-AI-62524
ANSIOMYCIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	OHIO STATE UNIV./N01-AI-62525
ANSIOMYCIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	WASHINGTON STATE UNIV./N01-AI-62526
ANSIOMYCIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	VA HOSPITAL-BALTIMORE/Y01-AI-60002
ARA-A-2',3'-DIACETATE (ARA-ADA)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF UTAH/R01-AI-20161-04
ARA-A-2'-MONOACETATE (ARA-AMA)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF UTAH/R01-AI-20161-04
ARA-A-5'-MONOBUTYRATE (ARA-AMB)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF UTAH/R01-AI-20161-04
AZIDOTHYMIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	VA HOSPITAL-BALTIMORE/Y01-AI-60002
DEAZUPURINE ANALOGS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF MICHIGAN/N01-AI-42554
DHPG		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF ALABAMA/N01-AI-62554
DHPG		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF UTAH/N01-AI-62518
DHPG		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	TULANE UNIV./N01-AI-6252.
DIDEOXYCYTIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	OHIO STATE UNIV./N01-AI-62525
DIDEOXYCYTIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	WASHINGTON STATE UNIV./N01-AI-62526
DIDEOXYCYTIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	VA HOSPITAL-BALTIMORE/Y01-AI-60002
DIDEOXYCYTIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	COLORADO STATE UNIV./N01-AI-62524
FLUOROPHOSPHONATE DERIVATIVES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF SOUTHERN CALIFORNIA/ R01-AI-21871-03
FMAU		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF UTAH/N01-AI-62518
FMAU		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	TULANE UNIV./N01-AI-62521

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
FOSCARNET		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	COLORADO STATE UNIV./N01-AI-62524
FOSCARNET		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	OHIO STATE UNIV./N01-AI-62525
FOSCARNET		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	WASHINGTON STATE UNIV./N01-AI-62526
FOSCARNET		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	D	VA HOSPITAL-BALTIMORE/Y01-AI-60002
INTERFERON		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF UTAH/N01-AI-62518
-INTERFERON		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	TULANE UNIV./N01-AI-62521
-INTERFERON		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	TULANE UNIV./N01-AI-62521
-INTERFERON		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF MASSACHUSETTS/N01-AI-62520
S-26308 (1-ISOBUTYL-1-H IMIDAZO[4,5-C] QUINOLIN-4-AMINE)		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	TULANE UNIV./N01-AI-62521
ISOQUINOLINES AND RELATED ANALOGS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF TEXAS/N01-AI-42557
N^2-SUBSTITUTED GUANINES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF MASSACHUSETTS/N01-AI-42556
RIBAVIRIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	BAYLOR UNIV./N01-AI-62522
RIBAVIRIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF MASSACHUSETTS/N01-AI-62520
RIMANTIDINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	BAYLOR UNIV./N01-AI-62522
RIMANTIDINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF MASSACHUSETTS/N01-AI-62520
TRIFLUOROTHYMIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF WISCONSIN/R01-AI-19043-06

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND SKIN DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETAMINOPHEN	103-90-2	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SUBCHRONIC TOXICITY	B	UNIV. OF UTAH/N01AM52264
ALUMINUM	7429-90-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	UNIV. OF WASHINGTON/K08AR01244
ARSENIC	7440-38-2	CARCINOGENESIS CHRONIC TOXICITY SUBCHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	MASSACHUSETTS GENERAL HOSPITAL/ N01AM32252
AZATHIOPRINE	446-86-6	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	NIH(NIAMS)/Z01AM41040
CARCINOGENS		CARCINOGENESIS CHRONIC TOXICITY SUBCHRONIC TOXICITY SYSTEMIC ORGAN TOXICITY	B	MASSACHUSETTS GENERAL HOSPITAL/ N01AM32252
CHLOROPROMAZINE	50-53-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	HAHNEMANN UNIVERSITY/R01AR32586
CYCLOPHOSPHAMIDE	50-18-0	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	NIH (NIAMS)/Z01AM41040
DOPAMINE	51-61-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETIC/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	DANA-FARBER CANCER INSTITUTE/R01AR31899
GOLD	7440-57-5	CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY	B	BRIGHAM AND WOMEN'S HOSPITAL/R01AR30486
GOLD	7440-57-5	CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	BRIGHAM AND WOMEN'S HOSPITAL/R01AR36814
GOLD	7440-57-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIFORMED SERVICES UNIVERSITY/R01AR34696
GOLD	7440-57-5	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SUBCHRONIC TOXICITY	B	UNIVERSITY OF UTAH/N01AM52264
GOLD SODIUM THIOMALATE	39377-38-3	CHRONIC TOXICITY SUBCHRONIC TOXICITY CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF UTAH/N01AM12204
GOLD SODIUM THIOMALATE	39377-38-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIFORMED SERVICES UNIVERSITY/R01AR34696

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0231

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND SKIN DISEASES

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
HYDROXYCHLOROQUINE	118-42-3	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SUBCHRONIC TOXICITY	B	UNIVERSITY OF UTAH/N01AM52264
LEVODOPA	59-92-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	DANA-FARBER CANCER INSTITUTE/R01AR31899
METHOTREXATE	59-05-2	CHRONIC TOXICITY SUBCHRONIC TOXICITY CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF UTAH/N01AM12204
METHOTREXATE	59-05-2	CLINICAL TOXICOLOGY/EPIDEMIOLOGY, SUBCHRONIC TOXICITY	B	UNIVERSITY OF UTAH/N01AM52264
PENICILLAMINE	52-67-5	CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY	B	BRIGHAM AND WOMEN'S HOSPITAL/R01AR30486
PHORBOL ESTERS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS, CLINICAL/TOXICOLOGY/ EPIDEMIOLOGY CARCINOGENESIS SYSTEMIC/ORGAN TOXICITY	C	COLUMBIA UNIV./R23AR33663
PROCAINAMIDE	51-06-9	CLINICAL TOXICOLOGY/EPIDEMIOLOGY IMMUNOLOGIC TOXICITY	B	SCRIPPS CLINIC AND RESEARCH FDN/R01AR34358
PSORALEN	66-97-7	CARCINOGENESIS CHRONIC TOXICITY SUBCHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY	B	MASSACHUSETTS GENERAL HOSPITAL/N01AM32252
TRANS-RETINOIC ACID	302-79-4	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	UNIV. OF CALIFORNIA LOS ANGELES/ R01AR34638
SALICYLAZOSULFAPYRIDINE (SULFASALAZINE)	599-79-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY CHRONIC TOXICITY SUBCHRONIC TOXICITY	A	UNIV. OF UTAH/N01AM12204
SULFANILAMIDE	63-74-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	HAHNEMANN UNIVERSITY/R01AR32586
TRIETHYLPHOSPHINE GOLD		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIFORMED SERVICES UNIVERSITY/ R01AR34696
VITAMIN A	68-26-8	CLINICAL TOXICOLOGY/EPIDEMIOLOGY SYSTEMIC/ORGAN TOXICITY	B	UNIVERSITY OF CALIFORNIA LOS ANGELES/ R01AR34638

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
INTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ADENOSINE TRIPHOSPHATE WITH PHENYLALKYLAMINES	56-65-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	NEUROTOXICOLOGY SECTION Z01 NS 02451-06 (LENP)
ANESTHETICS		NEUROLOGIC/BEHAVIORAL TOXICITY	B	LAB. NEUROPHYSIOLOGY/Z01 NS 02019-14 LNP
ANTICONVULSANTS		NEUROLOGIC/BEHAVIORAL TOXICITY	B	LAB. NEUROPHYSIOLOGY/Z01 NS 02019-14 LNP
ARTIFICIAL FOOD DYES		NEUROLOGIC/BEHAVIORAL TOXICITY	B	NEUROTOXICOLOGY SECT./Z01 NS 02264-10 (LNP)
6-AZAURACIL	461-89-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. MOLECULAR BIOLOGY/Z01 NS 01244-22 LNP
ALPHA BUNGAROTOXIN	11023-79-4	NEUROLOGIC/BEHAVIORAL TOXICITY	B	LAB. NEURO-OTOLARYNG./Z01 NS 02216-11 LNP
CHOLERA TOXIN ADENINE NUCLEOTIDES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DEVELOPMENTAL METABOLIC NEUROLOGY BRANCH Z01 NS 01309-21 (DMN)
CONVULSANTS		NEUROLOGIC/BEHAVIORAL TOXICITY	B	LAB. NEUROPHYSIOLOGY/Z01 NS 02019-14 LNP
DECOYININE	2004-04-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. MOLECULAR BIOLOGY/Z01 NS 01244-22 LNP
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	NEUROTOXICOLOGY SECTION Z01 NS 02264-10 (LENP)
DIETHYLSTILBESTROL	56-53-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	NEUROTOXICOLOGY SECTION Z01 NS 02264-10 (LENP)
ERYTHROSIN B	16423-68-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	NEUROTOXICOLOGY SECTION Z01 NS 02451-06 (LENP)
HADACIDIN	689-13-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. MOLECULAR BIOLOGY/Z01 NS 01244-22 (LENP)
HALOAROMATIC COMPOUNDS WITH BENZOPYRANS WITH XANTHENES WITH FLUORESCEINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	NEUROTOXICOLOGY SECTION Z01 NS 02451-06 (LENP)
INTERFERON	9008-11-1	IMMUNOLOGIC TOXICITY	B	INFECTIOUS DISEASES BRANCH Z01 NS 01983-15 (ID)
IN VITRO NEUROTOXICITY		NEUROLOGIC/BEHAVIORAL TOXICITY	B	LAB. NEUROPHYSIOLOGY/Z01 NS 02019-13 LNP

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
INTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ISOPROTERENOL	7683-59-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DEVELOPMENTAL METABOLIC NEUROLOGY BRANCH Z01 NS 02366-08 (DMN)
KAINIC ACID	487-79-6	NEUROLOGIC/BEHAVIORAL TOXICITY	B	LAB. NEURO-OTOLARYNGOLOGY Z01 NS 02216-11 LNO
KAINIC ACID	487-79-6	NEUROLOGIC/BEHAVIORAL TOXICITY	B	NEUROTOXICOLOGY SECTION Z01 NS 02264-10 (LENP)
LEAD	7439-92-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	NEUROTOXICOLOGY SECTION Z01 NS 02264-10 (LENP)
MANGANESE	7439-96-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	NEUROTOXICOLOGY SECTION Z01 NS 02264-10 (LENP)
NEUROPHARMACOLOGICAL AGENTS WITH ANTICONVULSANTS		NEUROLOGIC/BEHAVIORAL TOXICITY	B	MEDICAL NEUROLOGY BRANCH Z01 NS 02318-09 (MNB)
NEUROPHARMACOLOGICAL AGENTS WITH NEUROTOXINS WITH DOPAMINE WITH PROBENECID	 51-61-6 57-66-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	EXPERIMENTAL THERAPEUTICS BRANCH Z01 NS 02139-12 (ET)
NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. OF BIOPHYSICS/Z01 NS 02087 (LB)
PHENOBARBITAL WITH ANTICONVULSANTS WITH CARBAMAZEPINE	50-06-6 298-46-4	NEUROLOGIC/BEHAVIORAL TOXICITY	B	MEDICAL NEUROLOGY BRANCH/ Z01 NS 02236-11 (MNB)
PHENOBARBITAL WITH PYRIMIDINE	50-06-6 289-95-2	NEUROLOGIC/BEHAVIORAL TOXICITY	B	BIOMETRY AND FIELD STUDIES BRANCH/ Z01 NS 02444-07 (BFSB)
QUINIDINE	56-54-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. BIOPHYSICS/Z01 NS 02088-13 LB
STREPTOZOCIN	18883-66-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	LAB. NEUROCHEM./Z01 NS 02265-10 (LET) (EXPERIMENTAL THERAPEUTICS BRANCH)
TERATOGENIC AGENTS WITH DIPHENYLHYDANTOIN WITH VALPROIC ACID	 57-41-0 99-66-1	PHARMACOKINETICS/METABOLISM	B	LABORATORY OF MOLECULAR BIOLOGY Z01 NS 02365-08 (LMB)
TERATOGENIC AGENTS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	INFECTIOUS DISEASES BRANCH/ Z01 NS 00972-15 (ID)

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETYLCHOLINE	51-84-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MASSACHUSETTS GEN. HOSP./P50 NS 10828-12
ACETYLCHOLINE WITH NEUROTOXINS WITH VENOMS	51-84-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	ROCKEFELLER UNIV./R01 NS 18354-04A1
ADENINE NUCLEOTIDES		CHRONIC TOXICITY	B	UNIV. OF COLORADO, DENVER/5P50 NS 09199-16
ALCOHOL	64-17-5	NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
ALLETHRIN	584-79-2	CHRONIC TOXICITY	B	NORTHWESTERN UNIV., CHICAGO R01 NS 14143-10
ALUMINUM COMPOUNDS NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	MCLEAN HOSPITAL DIV. OF MASS GENERAL BELMONT/K07 NS 00835-03
AMINOGLYCOSIDE ANTIBIOTICS				
GENTAMYCIN	1403-66-3			
KANAMYCIN	59-01-8			
NEOMYCIN	1404-04-2			
STREPTOMYCIN	57-92-1			
TOBRAMYCIN	32986-56-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF MICHIGAN, ANN ARBOR/ 2P01 NS05785-22
AMINOPYRIDINES		CHRONIC TOXICITY	A	NORTHWESTERN UNIV., CHICAGO R01 NS 14144-10
ANTHOPLEURIN-A	60880-63-9	CHRONIC TOXICITY	A	NORTHWESTERN UNIV., CHICAGO R01 NS 14144-10
ANTIBIOTICS		PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
ANTIBIOTICS WITH DIURETICS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF MINNESOTA OF MNPLS-ST. PAUL P50 NS 12125-12
ANTIBIOTICS, AMINOGLYCOSIDE ANTIBIOTICS		SUBCHRONIC TOXICITY	B	GOOD SAMARITAN HOSPITAL & MEDICAL CENTER (PORTLAND, OREGON) R01 NS 19221-05
ANTIBIOTICS, ADRIAMYCIN NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	RUTGERS THE STATE UNIVERSITY (NEW BRUNSWICK, NEW JERSEY) R01 NS 23325-02

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
APOMORPHINE	58-00-4	CHRONIC TOXICITY	B	UNIV. OF COLORADO, DENVER/5P50 NS 09199-16
ATP	56-65-5	PHARMACOKINETICS/METABOLISM	A	UNIV. OF NEBRASKA MED. CTR., OMAHA R01 NS 15187-06
AZACHOLESTEROL COMPOUNDS		NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
BACTERIAL ENDOTOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF CALIF., SAN FRANCISCO P01 NS 14543-09
BACTERIAL ENDOTOXINS METALS, HEAVY METALS, COPPER (COMPOUNDS) ZINC (COMPOUNDS) PHENYLALKYLAMINES, CATECHOLAMINES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH./R01 NS 23633-01
BARBITURATES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF CALIF., SAN FRANCISCO P01 NS 14543-09
BIS-(THIOACETOXYL)AURATE(I)		CHRONIC TOXICITY	A	UNIV. OF PENNSYLVANIA/R01 NS 00282-34
BOTULINUM TOXIN WITH TETANUS TOXIN		CHRONIC TOXICITY	A	UNIV. OF CALIFORNIA, LOS ANGELES R01 NS 12873-09
BUNGAROTOXIN	37209-28-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	COLUMBIA UNIVERSITY/P01 NS 11766-12
BUNGAROTOXIN WITH GLUCOCORTOIDS WITH CATECHOLAMINES	37209-28-2	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	HARVARD UNIV., BOSTON/R01 NS 12651-11
BETA-BUNGAROTOXIN	12778-32-4	CHRONIC TOXICITY	A	UNIV. OF CALIFORNIA, LOS ANGELES R01 NS 12873-09
CARBACHOL	51-83-2	PHARMACOKINETICS/METABOLISM	A	WASHINGTON UNIV., ST. LOUIS R01 NS 12311-11
CARBAMAZEPINE	298-46-4	NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF CALIF., LOS ANGELES P01 NS 02808-25
CARBAMAZEPINE WITH DIPHENYLHYDANTOIN	298-46-4 57-41-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF MINNESOTA, MINNEAPOLIS, MINN. P50 NS 16308-07A1

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0236

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
CARBON	7440-44-0			
WITH ANTIBIOTICS (PENICILLIN)				
WITH TRITIUM	10028-17-8			
WITH NEUROPHARMACOLOGICAL AGENTS (ANTICONVULSANTS)				
WITH DOPAMINE	51-61-6			
WITH NOREPINEPHRINE	51-41-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	WASHINGTON UNIV., ST. LOUIS/ P01 NS 14834-08
CARBOXYLIC ACIDS				
NEUROPHARMACOLOGICAL AGENTS				
ANTICONVULSANTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF WASHINGTON, SEATTLE P01 NS 20482-03(0002)
CEPHEMS		PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
CHLORPROMAZINE	50-53-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIV. OF PENNSYLVANIA/P50 NS 10939-14A1
CHOLESTEROL	57-88-5			
WITH ACRYLAMIDE	79-06-1			
WITH PYRIMIDINES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MAYO FOUNDATION/P01 NS 14304-08
CHOLINE, ACETYCHOLINE				
NEUROTOXINS				
BUNGAROTOXIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	ST. LOUIS UNIVERSITY/R01 NS 17574-06
CHOLINE, ACETYLCHOLINE				
NEUROPHARMACOLOGICAL AGENTS,				
ANESTHETICS, LOCAL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF CALIFORNIA, LOS ANGELES, CA./ R01 NS 23512-01
CHOLINE, ACETYLCHOLINE				
SODIUM				
TETRODOTOXIN				
BUNGAROTOXIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF CALIFORNIA, LOS ANGELES, R01 NS 23753-01
CHOLINE, ACETYLCHOLINE				
BUNGAROTOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF CALIFORNIA, RIVERSIDE, CA. R01 NS 24207-02
CHOLINE, CARBACHOL				
TETRODOTOXIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF MASSACHUSETTS MED. SCH., WORCESTER, MA./R01 NS 24542-01
COLCHICINE	64-86-8	PHARMACOKINETICS/METABOLISM	A	UNIV. OF CALIFORNIA, SANTA BARBARA R01 NS 13560-10

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0237

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
COLCHICINE	64-86-8			
WITH MYCOTOXINS				
WITH CYTOCHALASIN	37187-49-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF UTAH/R01 NS 18112-05
CYCLIC AMP	60-92-4	CHRONIC TOXICITY	B	UNIV. OF COLORADO, DENVER/5P50 NS 09199-16
DDT	50-29-3	CHRONIC TOXICITY	B	NORTHWESTERN UNIV., CHICAGO R01 NS 14143-10
DEMECOLCINE	477-30-5			
WITH DIAZEPAM	439-14-5			
WITH CYTOCHALASIN	37187-49-8			
WITH MYCOTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	RUTGERS MED. SCHOOL, NEWARK, N.J. R01 NS 11299-11
DEMETON	8065-48-3	CHRONIC TOXICITY	B	NORTHWESTERN UNIV., CHICAGO R01 NS 14143-10
DEOXYGLUCOSE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	SLOAN-KETTERING INSTITUTE FOR CANCER RESEARCH, N.Y., N.Y./P01 NS 23473-03(0006)
DEOXYGLUCOSE				
WITH HEAVY METALS				
WITH ZINC COMPOUNDS				
WITH NEUROTOXINS				
WITH CARBON	7440-44-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIV. OF CONNECTICUT, STORRS P01 NS 16993-05
DIAZACHOLESTEROL	313-05-3	CHRONIC TOXICITY	B	UNIV. OF CINCINNATI/R01 NS 03178-21A1
20,25-DIAZACHOLESTEROL	313-05-3	NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
DIAZEPAM	439-14-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF CALIF., LOS ANGELES P01 NS 02808-25
DICHLOROBENZOIC ACIDS		NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
2,4-DICHLOROPHENOXYACETATE		NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
5,6-DIHYDROXYTRYPTAMINE	5090-36-8	CHRONIC TOXICITY	B	UNIV. OF PENNSYLVANIA/R01 NS 12211-12
DIPHENYLHYDANTOIN	57-41-0			
WITH NEUROPHARMACOLOGICAL AGENTS				
WITH ANTICONVULSANTS		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIVERSITY OF MINNESOTA/P50 NS 16308-07A1
DIPHTHERIA TOXINS		NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
DIPROPYLACETIC ACID	99-66-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	YALE UNIV./P50 NS 06208-21

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0238

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
DIPYRIDAMOLE	58-32-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	A	DUKE VETERANS ADMIN. CTR./P50 NS 06233-2051
DNP-LYSINE			B	UNIV. OF PUERTO RICO/P01 NS 07464-19
DOPA	59-92-7	CHRONIC TOXICITY	B	UNIV. OF COLORADO, DENVER/5P50 NS 09199-16
DOPAMINE	51-61-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MASSACHUSETTS GEN. HOSP./P450 NS 10828-27
GAMMA-AMINOBUTYRIC ACID				
KAINIC ACID				
NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF MED/DENT, NJ RUTGERS MEDICAL SCHOOL, PISCATAWAY, NJ/R01 17360-06
GEPHYROTOXIN	55893-12-4	PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
GLIOTOXINS		PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
GONYAUTOXINS	35554-08-6	PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
GRAYANOTOXIN	1399-60-6	CHRONIC TOXICITY	A	NORTHWESTERN UNIV.,CHICAGO/R01 NS 14144-10
GRISEOFULVIN	126-07-8	PHARMACOKINETICS/METABOLISM	A	UNIV. OF CALIFORNIA, SANTA BARBARA/ R01 NS 13560-10
HALOBENZENES		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF CALIFORNIA, LA JOLLA/ 2R01 NS 14162-09
HALOTHANE	151-67-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF CALIF., SAN FRANCISCO/ P01 NS 14543-09
HEXACHLOROPHENE	70-30-4	NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF CALIFORNIA, LA JOLLA/ 2R01 NS 14162-09
HISTAMINE	51-45-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF PUERTO RICO/P01 NS 07464-19
6-HYDROXYDOPAMINE	1199-18-4	CHRONIC TOXICITY	B	UNIV. OF PENNSYLVANIA/R01 NS 12211-12
KAINIC ACID	487-79-6	NEUROLOGIC/BEHAVIORAL TOXICITY	B	JOHNS HOPKINS UNIV./R01 NS 13584-10
LASALOCIDS	11054-70-9	PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
LEAD	7439-92-1			
WITH METHYL MERCURY	22967-92-6			
WITH ARSENIC (COMPOUNDS)				
WITH DOPAMINE	51-61-6			
WITH HEAVY METALS				
WITH NEUROTOXINS		NEUROLOGIC/BEHAVIORAL TOXICITY	A	MAYO FOUNDATION, ROCHESTER, MINN./ P01 NS 14304-08
LIPID SOLUBLE DRUGS		PHARMACOKINETICS/METABOLISM	B	UNIV. OF WASHINGTON, SEATTLE/ R01 NS 08174-18

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0239

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
LOCAL ANESTHETICS		PHARMACOKINETICS/METABOLISM	B	UNIV. OF WASHINGTON, SEATTLE R01-NS-08174-18
MAGNESIUM	7439-95-4	PHARMACOKINETICS/METABOLISM	A	UNIV. OF NEBRASKA MED. CTR., OMAHA R01 NS 15187-06
METALS				
HEAVY METALS				
TIN	7440-31-5			
NEUROTOXINS				
TETRODOTOXIN	4368-28-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	INDIANA UNIVERSITY/2R01NS18125-04 BLOOMINGTON, INDIANA
METHYL DEMETON	8022-00-2	CHRONIC TOXICITY	B	NORTHWESTERN UNIV., CHICAGO R01 NS 14143-10
METHYLPREDNISOLONE	83-43-2			
WITH NALOXONE	465-65-6	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	NEW YORK UNIV. MED. CTR., N.Y. P50 NS 10164-14
METRAZOLE	54-95-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF CALIF., LOS ANGELES P01 NS 02808-25
MORPHINE	57-27-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF CALIF., SAN FRANCISCO P01 NS 14543-09
NEUROPHARMACOLOGICAL AGENTS				
WITH ANESTHETICS, LOCAL				
NEUROTOXINS				
PROCAINE HYDROCHLORIDE				
CHLOROPROCAINE				
PHENYLAMIDES				
LIDOCAINE	137-58-6			
CATECHOLAMINES				
EPINEPHRINE	51-43-4			
SULFITES		PHARMACOKINETICS/METABOLISM	A	UNIVERSITY OF CALIFORNIA,SAN DIEGO R01 NS18715-03

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NEUROPHARMACOLOGICAL AGENTS				
ANTICONVULSANTS				
HYDANTOINS				
DIPHENYLHYDANTOIN	57-41-0			
BARBITURATES				
PHENOBARBITAL	50-06-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIVERSITY OF PENNSYLVANIA/ RO1NS19297-03
NEUROPHARMACOLOGICAL AGENTS				
ANTICONVULSANTS		BIOCHEMCIAL/CELLULAR/TISSUE EFFECTS	A	HAZLETON LABORATORIES CORPORATION, VIENNA, VA/ 5NO1 NS32358-06
NEUROPHARMACOLOGICAL AGENTS				
NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIVERSITY OF UTAH, SALT LAKE CITY, UTAH 1NO1 NS42361-07
NEUROPHARMACOLOGICAL AGENTS				
WITH ANTICONVULSANTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF MINNESOTA OF MNPLS- ST. PAUL P50 NS 16308-07A1
NEUROPHARMACOLOGICAL AGENTS				
WITH ANESTHETICS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	PENNSYLVANIA STATE UNIVERSITY HERSHEY MEDICAL CENTER/RO1 NS 16737-05
NEUROPHARMACOLOGICAL AGENTS				
WITH ANTICONVULSANTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF WASHINGTON/P50 NS17111-05
NEUROPHARMACOLOGICAL AGENTS				
WITH ANTICONVULSANTS				
WITH CONVULSANTS				
WITH NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	DUKE UNIV.-VETERANS ADMIN. HOSP., DURHAM, NC/PO1 NS 17771-05
NEUROPHARMACOLOGICAL AGENTS				
WITH NEUROTOXINS				
WITH TETRODOTOXIN	4368-28-9			
WITH SAXITOXIN	35523-89-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	YALE UNIV. SCHOOL OF MEDICINE/ RO1 NS 17928-05
NEUROPHARMACOLOGICAL AGENTS				
ANESTHETICS, LOCAL				
TETRODOTOXIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	STANFORD UNIVERSITY/RO1 NS 14345-09

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0241

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NEUROPHARMACOLOGY TRITIUM THEOPHYLLINE PYRIMIDINES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF IOWA/R01 NS 15073-09
NEUROPHARMACOLOGY NEUROTOXINS HYDROGEN PEROXIDE TRITIUM SEROTONIN PHENYLALKYLAMINES, CATECHOLAMINES, L-HYDROXY-DOPAMINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF KANSAS LAWRENCE/R01 NS 15692-08
NEUROPHARMACOLOGICAL AGENTS ANESTHETICS, LOCAL NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF CALIFORNIA,SAN DIEGO R01 NS 19715-03
NEUROPHARMACOLOGICAL AGENTS ANTICONVULSANTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF WASHINGTON,SEATTLE/ P01 NS 20482-03(0001)
NEUROPHARMACOLOGICAL AGENTS ANTICONVULSANTS NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF VIRGINIA, CHARLOTTESVILLE/ R01 NS 21671-02
NEUROPHARMACOLOGY NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	THOMAS JEFFERSON UNIVERSITY,PHILADELPHIA, PENNSYLVANIA/R02 NS 22153-02
NEUROPHARMACOLOGICAL AGENTS PHENYLALKYLAMINES, CATECHOLAMINES, DOPAMINE, NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF COLORADO, DENVER, COLO./ R15 NS 23191-01
NEUROPHARMACOLOGICAL AGENTS NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIV. OF KANSAS SCHOOL OF MEDICINE, WICHITA, KS./R01 NS 23645-02

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NEUROPHARMACOLOGICAL AGENTS ANESTHETICS, LOCAL NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	BAYLOR COLLEGE OF MEDICINE HOUSTON, TX./ E01 NA 24606-01
NEUROTOXINS GAMMA-AMINOBUTYRIC ACID BENZODIAZEPINES CHOLINE ACETYLCHOLINE	51-84-3	BIOCHEMICAL/CELLULAR /TISSUE EFFECTS	B	JOHNS HOPKINS UNIVERSITY/5K07NS00799-04 BALTIMORE, MARYLAND
NEUROTOXINS TETRODOTOXIN SAXITOXIN	4368-28-9 35523-89-8	MUTAGENESIS/GENETIC TOXICITY	B	ALBERT EINSTEIN COLLEGE OF MEDICINE/ 5R01NS16204-08 BRONX, NEW YORK
NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIVERSITY OF ALABAMA, BIRMINGHAM/ R01NS19183-03
NEUROTOXINS CYANIDES AMIDES, ACRYLAMIDES ANTIBIOTICS, ADRIAMYCIN	23214-92-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	YESHIVA UNIVERSITY, NEW YORK, NY/ 1P01NS19611-03S1
NEUROTOXINS QUINOLINES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	VANDERBILT UNIVERSITY, NASHVILLE, TN/ 2R01NS20509-04
NEUROTOXINS		PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
NEUROTOXINS WITH BUNGAROTOXIN	37209-28-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	COLUMBIA UNIVERSITY/P01 NS 11766-12
NEUROTOXINS WITH BUNGAROTOXIN	37209-28-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIVERSITY OF CALIFORNIA SAN DIEGO R01 NS 12601-11
NEUROTOXINS		IMMUNOLOGIC TOXICITY	B	COLUMBIA UNIVERSITY/R01 NS 15581-07
NEUROTOXINS		NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIVERSITY OF MINNESOTA OF MNPLS-ST. PAUL R01 NS 16567-06
NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIVERSITY OF FLORIDA/R01 NS 18268-05

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0243

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
NEUROTOXINS WITH SODIUM WITH VENOMS	17341-25-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIV. OF MARYLAND AT BALTIMORE R01 NS 16285-06
NEUROTOXINS		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF ARKANSAS, LITTLE ROCK/ R01 NS 04761-23
NEUROTOXINS SOMATASTATIN TOXALBUMINS (PLANT)		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	MASSACHUSETTS GENERAL HOSPITAL/ K07 NS 00885-03
NEUROTOXINS NEUROPHARMACOLOGICAL AGENTS, ANTICONVULSANTS ALKALOIDS OPIATES ANTIBIOTICS, OLIGOMYCIN TRITIUM ENKEPHALIN TETROTOXIN, VENOMS, GRAYANOTOXINS, SAXITOXIN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF WASHINGTON, SEATTLE R01 NS 15751-07
NEUROTOXINS NEUROPHARMACOLOGY QUINOLINES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	VANDERBILT UNIVERSITY/R01 NS 20509-04
NEUROTOXINS NEUROPHARMACOLOGICAL AGENTS PYRIDINES NICOTINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIV. OF MED./DENT. NJ-RUTGERS MED. SCH., PISCATAWAY, NJ/R01 NS 21752-02
NEUROTOXINS PYRIDINES		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	RUTGERS UNIV. NEW BRUNSWICK, N.J./ R01 NS 23519-01
NEUROTOXINS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	RES. FOUNDATION FOR MENTAL HYGIENE ORANGEBURG, N.Y./R01 NS 24488-01
NEUROTOXINS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF FLORIDA GAINESVILLE, FL./ R01 NS 24883-01
NITROGLYCERIN	55-63-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MASSACHUSETTS GEN. HOSP./P50 NS 10828-12
NOREPINEPHRINE	51-41-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MASSACHUSETTS GEN. HOSP./P50 NS 10828-12

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
OLIGOMYCIN	1404-19-9	NEUROLOGIC/BEHAVIORAL TOXICITY	B	STANFORD UNIV./P50 NS 12151-12
PALYTOXIN	11077-03-5	CHRONIC TOXICITY	A	NORTHWESTERN UNIV., CHICAGO R01 NS 14144-10
PARACHLOROPHENYLALANINE	1991-78-2	CHRONIC TOXICITY	B	UNIV. OF PENNSYLVANIA/R01 NS 12211-12
PENAMS		PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
PENTYLENETETRAZOLE	54-95-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	STANFORD UNIV./P50 NS 12151-12
PERHYDROHISTRIONICOTOXIN	40709-29-3	PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
PHENOBARBITAL	50-06-6	NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF CALIF., LOS ANGELES P01 NS 02808-25
PHENOXYBENZAMINE	59-96-1	PHARMACOKINETICS/METABOLISM	A	WASHINGTON UNIV., ST. LOUIS R01 NS 12311-11
PHENYTOIN	57-41-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	YALE UNIV./P50 NS 06208-21
PHOSPHOPROTEIN PHOSPHATASES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	RUTGERS MED. SCH./R01 NS 11252-13
PICROTOXIN	124-87-8			
WITH METHYL PREDNISOLONE	83-43-2			
WITH NEUROPHARMACOLOGICAL AGENTS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	WASHINGTON UNIVERSITY/P01 NS 15070-07
PIMOZIDE	2062-78-4			
HALOPERIDOL	52-86-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MT. SINAI SCHOOL OF MEDICINE, N.Y./ 1R01 NS20529-03
TRANQUILIZERS				
ANTI-PLATELET DRUGS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	A	DUKE VETERANS ADMIN. CTR./P50 NS 06233-2051
PROCTOLIN	57966-42-4		B	UNIV. OF PUERTO RICO/P01 NS 07464-19
PROSTAGLANDIN E1	745-65-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	JOHN B. PIERCE FDN. OF CONNECTICUT R01 NS 11487-12
PROSTAGLANDINS				
WITH INDOMETHACIN	53-86-1			
WITH PHENYLCARBOXYLATES				
WITH SALICYLATES		CHRONIC TOXICITY	A	UNIV. OF MINNESOTA, DEPT. OF OTOLARYNGOLOGY/P50 NS 14538-08
QUINAZOLINONES		PHARMACOKINETICS/METABOLISM	A	VPI, BLACKSBURG, VIRGINIA/R01 NS 10197-10
QUINEBIDIMYL BENZILATE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	A	DUKE VETERANS ADMIN. CTR./P50 NS 06233-2051
RAUWOLFIA ALKALOIDS		CHRONIC TOXICITY	B	UNIV. OF COLORADO, DENVER/5P50 NS 09199-16

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0245

TOXICOLOGY TESTING

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
RESERPINE	50-55-5	PHARMACOKINETICS/METABOLISM	A	UNIV. OF NEBRASKA MED. CTR., OMAHA R01 NS 15187-06
RESERPINE	50-55-5	CHRONIC TOXICITY	B	UNIV. OF PENNSYLVANIA/R01 NS 12211-12
SAXITOXIN	35523-89-8	PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
SAXITOXIN	35523-89-8	CHRONIC TOXICITY	A	NORTHWESTERN UNIV., CHICAGO R01 NS 14144-10
SCOPOLAMINE	51-34-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	UNIV. OF PENNSYLVANIA/P50 NS 10939-14A1
SCORPION VENOM		PHARMACOKINETICS/METABOLISM	B	UNIV. OF WASHINGTON, SEATTLE R01 NS 08174-18
SEROTONIN	50-67-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MASSACHUSETTS GEN. HOSP./P50 NS 10828-12
STRYCHNINE	57-24-9	PHARMACOKINETICS/METABOLISM	B	UNIV. OF WASHINGTON, SEATTLE R01 NS 08174-18
SULFANILAMIDES FUROSEMIDE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	SOUTHERN ILLINOIS UNIVERSITY SCH. OF MED., SPRINGFIELD, ILLINOIS/R01 NS 22530-02
SULFAPYRAZINE	116-44-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	A	DUKE VETERANS ADMIN. CTR./P50 NS 06233-2051
SYNTHETIC PYRETHROIDS		CHRONIC TOXICITY	B	NORTHWESTERN UNIV., CHICAGO R01 NS 14143-10
TETANUS TOXIN		CHRONIC TOXICITY	A	UNIV. OF CALIFORNIA, LOS ANGELES R01 NS 12873-09
TETRODOTOXIN	4368-28-9	PHARMACOKINETICS/METABOLISM	B	HARVARD UNIV., BOSTON/R01 NS 12108-12
TETRODOTOXIN	4368-28-9	CHRONIC TOXICITY	A	NORTHWESTERN UNIV., CHICAGO R01 NS 14144-10
TRICHLOROBENZOIC ACIDS	1319-85-3	NEUROLOGIC/BEHAVIORAL TOXICITY	A	UNIV. OF PENNSYLVANIA/P50 NS 08075-16
TRIMETHYLOXONIUM	43625-65-6	PHARMACOKINETICS/METABOLISM	B	UNIV. OF WASHINGTON, SEATTLE R01 NS 08174-18
VENOMS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	A	UNIVERSITY OF CONNECTICUT, STORRS R01 NS 14521-09
VERATRIDINE	71-62-5	CHRONIC TOXICITY	A	NORTHWESTERN UNIV., CHICAGO R01 NS 14144-10
VINBLASTINE WITH NEUROPHARMACOLOGICAL AGENTS	865-21-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MAYO FOUNDATION/R01 NS 11855-14

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TOXICOLOGY TESTING

NATIONAL EYE INSTITUTE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ACETAMINOPHEN	103-90-2	CHRONIC TOXICITY BIOCHEMICAL EFFECTS GENETIC TOXICITY	B	INST. BIOL. SCIENCES, ROCHESTER, MI/ 5R01 EY04694-04
ACYCLOVIR (ACV)	59277-89-3	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	LOUISIANA STATE UNIV. MEDICAL CENTER/ 5R01 EY02672-09
ADRIAMYCIN	23214-92-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	EMORY UNIVERSITY SCHOOL OF MEDICINE/ 5R01 EY03847-05
ADRIAMYCIN	23214-92-8	CHRONIC TOXICITY CELLULAR EFFECTS	B	BAYLOR COLL. OF MEDICINE/5R01
ALCOHOL		MUTAGENESIS/GENETIC TOXICITY	A	UNIVERSITY OF NORTH CAROLINA SCHOOL OF MEDICINE/5F32 EY05918-02
ALLOXAN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MEDICAL COLLEGE OF GEORGIA/5R01 EY04479-05
AMIKACIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY04474-05
BUPIVACAINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS, PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF MICHIGAN/1R01 EY05813-01A1
T-BUTYLATED HYDROXY-ANISOL (BHA)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF TEXAS MEDICAL BR. GALVESTON/ 2R01 EY04396-04
T-BUTYLATED HYDROXY-TOLUENE (BHT)	128-37-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIV. OF TEXAS MEDICAL BR. GALVESTON/ 2R01 EY04396-04
CADMIUM SULFIDE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	MEDICAL COLLEGE OF GEORGIA/ 5R01 EY04479-05
CYCLOSPORINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM	B	LOUISIANA STATE UNIVERSITY MEDICAL CTR./ 5R01 EY-02672-09
CYCLOSPORINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	NATIONAL EYE INSTITUTE/Z01-EY00115-06
CYCLOSPORINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	NATIONAL EYE INSTITUTE/Z01 EY00219-01

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TOXICOLOGY TESTING

NATIONAL EYE INSTITUTE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
DIHYDROXY PROPYL GUANOSINE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM	B	LOUISIANA STATE UNIVERSITY MEDICAL CTR./ 5R01 EY02672-09
ENDOTOXIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	NATIONAL EYE INSTITUTE/Z01 EY00221-01
FLUBOPROFEN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM	B	LOUISIANA STATE UNIVERSITY MEDICAL CTR./ 5R01 EY02672-09
5-FLUOROURACIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	WASHINGTON UNIVERSITY SCHOOL OF MEDICINE/ 5U01 EY05436-02
5-FLUOROURACIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF ILLINOIS AT CHICAGO/ 5U01 EY05446-02
5-FLUOROURACIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF MIAMI SCHOOL OF MEDICNE/ 5U01 EY05473-02
5-FLUOROURACIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF MIAMI SCHOOL OF MEDICINE/ 5U01 EY05480-02
5-FLUOROURACIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	UNIVERSITY OF FLORIDA SCHOOL OF MEDICINE/ 5U01 EY05604-02
5-FLUOROURACIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	LORAIN COMMUNITY HOSPITAL, LORAIN, OHIO/ 3U01 EY06500-01S1
5-FLUOROURACIL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	OAKLAND UNIVERSITY EYE RESEARCH INSTITUTE/ 1R01 EY06520-01
FLUOROURIDINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	OAKLAND UNIVERSITY EYE RESEARCH INSTITUTE/ 1R01 EY06520-01
GENTAMICIN	1403-66-3	CHRONIC TOXICITY	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY04474-05
GLUTAMATE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	RUTGERS UNIVERSITY/5F32 EY05872-02
HEMATOPORPHYRIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	MEDICAL COLLEGE OF GEORGIA/ 5R01 EY04479-05
HYDROGEN PEROXIDE	7722-84-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	MEDICAL COLLEGE OF GEORGIA/ 5R01 EY04479-05
HYDROGEN PEROXIDE	7722-84-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	OAKLAND UNIV. COLLEGE OF ARTS AND SCIENCE/ 5R01 EY04694-04
HYDROGEN PEROXIDE	7722-84-1	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 2R01 EY05681-04
HYDROGEN PEROXIDE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	OAKLAND UNIVERSITY/2R01 EY02027-10
HYDROXYEICOSATETRAENOIC ACIDS (HETES)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UPSTATE MEDICAL CENTER, COLLEGE OF MEDICINE, SUNY/5R01 EY05614-02

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0248

TOXICOLOGY TESTING

NATIONAL EYE INSTITUTE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
HYDROXYL RADICAL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 2R01 EY05681-04
HYDROXYL RADICAL		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MEDICAL COLLEGE OF GEORGIA/5R01 5R01 EY04479-05
INTERFERON	9008-11-1	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	LOUISIANA STATE UNIV. MEDICAL CENTER/ 5R01 EY02672-09
ISOPROTERENOL	7683-59-2	PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF FLORIDA, COLLEGE OF PHARMACY/5R01 EY05800-02
KANAMYCIN	59-01-8	SYSTEMIC/ORGAN TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY-04474-05
KANAMYCIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY04474-05
LIDOCAINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF MICHIGAN/1R01 EY05813-01A1
MALONDIALDEHYDE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	GOOD SAMARITAN HOSPITAL AND MEDICAL CENTER, PORTLAND/5Rol EY01779-11
MEPIVACAINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF MICHIGAN/1R01 EY05813-01A1
8-METHOXYPSORALEN	298--81-7	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	EMORY UNIVERSITY SCHOOL OF MEDICINE/ 5 R01 EY03847-05
NETILMICIN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY04474-05
OXYGEN RADICALS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	BAYLOR COLLEGE OF MEDICINE/ 5 R01 EY04149-05
OXYGEN RADICALS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	OAKLAND UNIVERSITY/2R01 EY02027-10
OXYGEN RADICALS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MOUNT SINAI SCHOOL OF MEDICINE/ 2R01 EY03012-09
OXYGEN RADICALS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MEDICAL COLLEGE OF SOUTH CAROLINA/ 5R01 EY05757-01A1
OXYGEN RADICALS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	OKLAHOMA MEDICAL RESEARCH FOUNDATION/ 1R01 EY05138-01
OXYGEN (SINGLET)		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	SRI INTERNATIONAL/5R01 EY05910-02
PHENYLEPHRINE		PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF FLORIDA, COLLEGE OF PHARMACY/5R01 EY05800-02
PROPANOLOL	525-66-6	PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF FLORIDA, COLLEGE OF PHARMACY/5R01 EY05800-02
PSORALENS		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	EMORY UNIVERSITY SCHOOL OF MEDICINE/ 5R01 EY03847-05
SORBINIL		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	NATIONAL EYE INSTITUTE/Z01 EY00198-03

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TOXICOLOGY TESTING

NATIONAL EYE INSTITUTE
EXTRAMURAL PROGRAM

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
SUPEROXIDE ANION		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS SYSTEMIC/ORGAN TOXICITY	B	MEDICAL COLLEGE OF GEORGIA/ 5R01 EY04479-04
SUPEROXIDE ANION		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY05681-03
SUPEROXIDE ANION		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	ESTELLE DOHENY EYE FOUNDATION/5R01 EY05662-02
SUPROFEN		CLINICAL TOXICOLOGY/EPIDEMIOLOGY PHARMACOKINETICS/METABOLISM	B	LOUISIANA STATE UNIVERSITY MEDICAL CTR./ 5R01 EY02672-09
TERBUTALINE	23031-25-6	PHARMACOKINETICS/METABOLISM	B	UNIVERSITY OF FLORIDA, COLLEGE OF PHARMACY/5R01 EY05800-02
THIORIDAZINE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	A	UNIVERSITY OF WISCONSIN/1R15 EY06712-01
TIMOLOL		PHARMACOKINETICS/METABOLISM		UNIVERSITY OF FLORIDA, COLLEGE OF PHARMACY/5R01 EY05800-02
TOBRAMYCIN	32986-56-4	CHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	MASSACHUSETTS EYE AND EAR INFIRMARY/ 5R01 EY04474-05

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF DENTAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
DIMETHYLSUBERIMIDATE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF TEXAS HLTH. SCI. CENTER/ R01 DE 06446
GLUTARALDEHYDE	111-30-8	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	UNIVERSITY OF TEXAS HLTH. SCI. CENTER/ R03 DE 06446
SODIUM FLUORIDE	7681-49-4	CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	NATIONAL INSTITUTE OF DENTAL RESEARCH/ Z01 DE 00396

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C251

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
CARBOPLATIN		PHARMACOKINETICS/METABOLISM	B	BIOMED. ENG. AND INSTRUM. BRANCH Z01-RS 10001-18
CIS-DICHLORODIAMINEPLATINUM (II)	15663-27-1	PHARMACOKINETICS/METABOLISM	B	BIOMED. ENG. AND INSTRUM. BRANCH Z01-RS 10001-18
IPROPLATIN		PHARMACOKINETICS/METABOLISM	B	BIOMED. ENG. AND INSTRUM. BRANCH Z01-RS 10001-18
METHOTREXATE	59-05-2	PHARMACOKINETICS/METABOLISM	B	BIOMED. ENG. AND INSTRUM. BRANCH Z01-RS-10249-01

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TOXICOLOGY TESTING

NATIONAL INSTITUTE OF MENTAL HEALTH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
BENZODIAZEPINES		NEUROLOGIC/BEHAVIORAL TOXICITY	B	UNIV. OF ROCHESTER/5R01 MH31850-07
LITHIUM	7439-93-2	CHRONIC TOXICITY	B	WASHINGTON UNIVERSITY/2R01 MH37967
LITHIUM		CHRONIC TOXICITY	B	LONG ISLAND JEWISH HILLSIDE HOSPITAL AND HARVARD MEDICAL SCHOOL 1R01 MH37576 and MH37587
MPTP (1-METHYL-4-PHENYL-1,2,3,6-TETRAHYDROPYRIDINE)		NEUROTOXICITY	B	NIMH INTRAMURAL Z01 MH00279-03LCS
NEUROLEPTICS		CHRONIC TOXICITY	B	UNIV. OF MICHIGAN/2R01 MH 36044-04
NEUROLEPTICS		CHRONIC TOXICITY	B	MEDICAL RESEARCH FOUNDATION OF OREGON 5R01 MH 36657-05
NEUROLEPTICS		SUBCHRONIC TOXICITY	B	YALE UNIVERSITY/5 R01 MH28849-09
NEUROLEPTICS		CHRONIC TOXICITY	A	BOSTON MENTAL HEALTH FOUNDATION/ 5R01 MH32675-06
NEUROLEPTICS		CHRONIC TOXICITY	B	NEW YORK UNIVERSITY/5R01 MH39537-02
NEUROLEPTICS		CHRONIC/SUBACUTE TOXICITY	C	YALE UNIVERSITY/5R01 MH 39665-02
NEUROLEPTICS		CHRONIC TOXICITY	B	RESEARCH FOUNDATION FOR MENTAL HYGIENE/ 1R01 MH39037
NEUROLEPTICS		CHRONIC TOXICITY	B	RUSH PRESBYTERIAN, ST. LUKES 1R01 MH41274
PSYCHOTROPICS		SUBACUTE TOXICITY	B	TENNESSEE NEUROPSYCHIATRIC INSTITUTE/ 5R01 MH38768-08

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TOXICOLOGY TESTING

NATIONAL INSTITUTE ON DRUG ABUSE

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	NEUROLOGIC/BEHAVIORAL TOXICITY CHRONIC TOXICITY	B	NATL. CENTER FOR TOXICOLOGICAL RESEARCH

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TOXICOLOGY TESTING

DEPARTMENT OF ENERGY
OFFICE OF HEALTH AND ENVIRONMENTAL RESEARCH

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
ALKYLATING AGENTS		MUTAGENESIS/GENETIC TOXICITY	B	OAK RIDGE NAT'L. LAB./1570
AROMATIC AMINES		MUTAGENESIS/GENETIC TOXICITY		
		PHARMACOKINETICS/METABOLISM	B	BATTELLE PACIFIC NORTHWEST LAB./1994
BENZO(A)PYRENE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		
		PULMONARY TOXICITY	B	INHALATION TOXICOL. RES. INST./4496
COAL LIQUEFACTION MATERIALS		ACUTE/CHRONIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	BATTELLE PACIFIC NORTHWEST LAB./3453
ENERGY-RELATED MIXTURES		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		
		CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY	B	ARGONNE NAT'L. LAB./3439
ENERGY-RELATED MIXTURES		ACUTE/CHRONIC TOXICITY		
		CARCINOGENESIS		
		IMMUNOLOGIC TOXICITY		
		MUTAGENESIS/GENETIC TOXICITY		
		PHARMACOKINETICS/METABOLISM		
		PULMONARY TOXICITY		
		SYSTEMIC/ORGAN TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	BATTELLE PACIFIC NORTHWEST LAB./2710
ENERGY-RELATED MIXTURES OXYGEN RADICALS				
		ACUTE/CHRONIC TOXICITY		
		IMMUNOLOGIC TOXICITY		
		NEUROLOGIC/BEHAVIORAL TOXICITY		
		PULMONARY TOXICITY		
		SYSTEMIC/ORGAN TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	OAK RIDGE NAT'L. LAB./2362
OIL SHALE PRODUCTS		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	LOS ALAMOS NATIONAL LABORATORY/3005

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TOXICOLOGY TESTING

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
2-ACETAMIDOFLUORENE		CARCINOGENESIS	B	HERL
2-ACETYLAMINOFLUORENE	53-96-3	CARCINOGENESIS	B	HERL
3-ACETYLPYRIDINE	350-03-8	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
ACIFLUORFEN		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
ACROLEIN	107-02-8	PULMONARY TOXICITY		
		IMMUNOLOGIC TOXICITY	D	HERL
ACRYLAMIDE	79-06-1	NEUROLOGIC/BEHAVIORAL TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		MUTAGENESIS/GENETIC TOXICITY	B	HERL
ADRIAMYCIN	23214-92-8	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
ALLYL ALCOHOL	107-18-6	PHARMACOKINETICS/METABOLISM	A	HERL
9-AMINOACRIDINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
4-AMINOBIPHENYL	92-67-1	CARCINOGENESIS	B	HERL
4-AMINOBIPHENYL	92-67-1	CARCINOGENESIS	B	HERL
1-AMINO-2-METHYLANTHRAQUINONE	82-28-0	MUTAGENESIS/GENETIC TOXICITY	C	HERL
3-AMINOPYRIDINE	79-06-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
AMITRAZ	33089-61-1	NEUROLOGIC/BEHAVIORAL TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
AMMONIUM SULFATE	7783-20-2	IMMUNOLOGIC TOXICITY		
		PULMONARY TOXICITY	B	HERL
AMPHOTERICIN B	1397-89-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
2-ANTHRAMINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
AROCHLOR		MUTAGENESIS/GENETIC TOXICITY	B	HERL
ARSENIC	7440-38-2	CARCINOGENESIS	B	HERL
ASBESTOS	1332-21-4	CARCINOGENESIS		
		TISSUE EFFECTS		
		MUTAGENESIS/GENETIC TOXICITY	B	HERL
ASPHALTIC BASED PAINTS		CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY	B	HERL
ATRAZINE	1912-24-9	PHARMACOKINETICS/METABOLISM	B	HERL
5-AZACYTIDINE	320-67-2	CARCINOGENESIS	B	HERL
5-AZACYTIDINE	320-67-2	MUTAGENESIS/GENETIC TOXICITY	B	HERL
8-AZAGUANINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
AZINPHOS-METHYL	86-50-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
AZIRIDINYLBENZOQUINONE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
BARIUM	10361-37-2	CARCINOGENESIS	A	HERL
BENOMYL	17804-35-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
BENZ(1)ACEANTHRYLENE		CARCINOGENESIS	B	HERL

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0256

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
BENZ(A)ANTHRACENE	56-55-3	MUTAGENESIS/GENETIC TOXICITY	B	HERL
BENZENE	71-43-2	MUTAGENESIS/GENETIC TOXICITY		
		PULMONARY TOXICITY	B/D	HERL
BENZIDINE	92-87-5	MUTAGENESIS/GENETIC TOXICITY	B	HERL
BENZO(A)PYRENE	50-32-8	MUTAGENESIS/GENETIC TOXICITY		
		CARCINOGENESIS	B	HERL
BENZYL ACETATE	140-11-4	MUTAGENESIS/GENETIC TOXICITY	B	HERL
BIFENOX		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
BISBENZIMIDE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
BROMOBENZENE	108-86-1	PHARMACOKINETICS/METABOLISM	D	HERL
5-BROMO-2-DEOXYURIDINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
BRUCINE	357-57-3	SUBCHRONIC TOXICITY	A	DYNAMAC FOR OFFICE OF SOLID WASTE
BUTYLATED HYDROXYTOLUENE	128-37-0	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	HERL
BUTYRIC ACID	107-92-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
CACODYLIC ACID	75-60-5	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
CADMIUM	7440-43-9	NEUROLOGIC/BEHAVIORAL TOXICITY	C	HERL
CADMIUM CHLORIDE	10108-64-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		IMMUNOLOGIC TOXICITY	A	HERL
CADMIUM SULFATE	10124-36-4	PULMONARY TOXICITY	B	HERL
CAFFEINE	58-08-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
CALCIUM CHROMATE	13765-19-0	MUTAGENESIS/GENETIC TOXICITY	B	HERL
CAPRYLIC ACID		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
CAPSAICIN	404-86-4	NEUROLOGIC/BEHAVIORAL TOXICITY	C	HERL
CAPTAN		PHARMACOKINETICS/METABOLISM	B	HERL
		MUTAGENESIS/GENETIC TOXICITY		
CARBARYL	63-25-2	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
CARBARYL	63-25-2	PHARMACOKINETICS/METABOLISM	B	HERL
CARBENDAZIM		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
CARBOFURAN		PHARMACOKINETICS/METABOLISM	B	HERL
CARBON MONOXIDE	630-08-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
CARBON MONOXIDE	630-08-0	SYSTEMIC/ORGAN TOXICITY	B	HERL
CARBON TETRACHLORIDE	56-23-0	SUBCHRONIC TOXICITY		
		SYSTEMIC/ORGAN TOXICITY		
		CARCINOGENEIS		
		MUTAGENESIS		
		REPRODUCTIVE TOXICITY		

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TOXICOLOGY TESTING

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		
		CLINICAL TOXICOLOGY/EPIDEMIOLOGY		
		PULMONARY TOXICITY	A	HERL
CHLORAMBUCIL	305-03-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
CHLORAMINE	10599-90-3	PHARMACOKINETICS/METABOLISM		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
CHLORAMINE	10599-90-3	CLINICAL TOXICOLOGY/EPIDEMIOLOGY		
		SUBCHRONIC TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	C	HERL
CHLORAZOL BLACK		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
CHLORDANE	57-74-9	MUTAGENESIS/GENETIC TOXICITY	B	HERL
CHLORDECONE (KEPONE)	143-50-0	PHARMACOKINETICS/METABOLISM	B	HERL
		NEUROLOGIC/BEHAVIORAL TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
CHLORDIMEFORM	6164-98-3	NEUROLOGIC/BEHAVIORAL TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
CHLORINATION BI-PRODUCTS		CARCINOGENESIS	B	HERL
CHLORINE (CHLORINATED DRINKING WATER)	7990-92-3	CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		CLINICAL TOXICOLOGY/EPIDEMIOLOGY		
		PHARMACOKINETICS/METABOLISM		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
CHLORINE DIOXIDE	10049-04-4	PHARMACOKINETICS/METABOLISM		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
CHLORINE DIOXIDE	10049-04-4	SUBCHRONIC TOXICITY		
		SYSTEMIC/ORGAN TOXICITY	C	HERL
CHLOROACETIC ACID	79-01-7	CARCINOGENESIS		
		PHARMACOKINETICS/METABOLISM	D	HERL
CHLOROBENZENE	108-90-7	SUBCHRONIC TOXICITY	C	HERL
CHLOROFORM	67-66-3	PULMONARY TOXICITY		
		IMMUNOLOGIC TOXICITY		
		PHARMACOKINETICS/METABOLISM		
		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	D/B	HERL

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ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
2-CHLOROPHENOL	95-57-8	SUBCHRONIC TOXICITY		
		CARCINOGENESIS	B	HERL
CHLOROPICRIN	76-06-2	CLINICAL TOXICOLOGY/EPIDEMIOLOGY		
		SUBCHRONIC TOXICITY	B/C	HERL
5-CHLOROURACIL		IMMUNOLOGIC TOXICITY	B	HERL
CHLORPYRIFOS		PHARMACOKINETICS/METABOLISM	B	HERL
COAGULANTS, COAGULANT AIDS		CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY	B	HERL
COAL TAR		CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY	B	HERL
COBALT CHLORIDE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
COLCHICINE	64-86-8	MUTAGENESIS/GENETIC TOXICITY	B	HERL
CONGO RED		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
CRYOLITE	15096-52-3	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
CYCLOPHOSPHAMIDE	50-18-0	IMMUNOLOGIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY		
		MUTAGENESIS/GENETIC TOXICITY	A/B	HERL
CYCLOSPORIN A	59865-13-3	IMMUNOLOGIC TOXICITY	A/B	HERL
CYPERMETHRIN	52315-07-8	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
DAUNOMYCIN	20830-81-3	MUTAGENESIS/GENETIC TOXICITY	B	HERL
DDE		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	HERL
DDT	50-29-3	MUTAGENESIS/GENETIC TOXICITY		
		NEUROLOGIC/BEHAVIORAL TOXICITY		
		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	HERL
DEMECOLCINE	477-30-5	MUTAGENESIS/GENETIC TOXICITY	B	HERL
2'-DEOXYCOFORMYCIN		IMMUNOLOGIC TOXICITY	A/B	HERL
DIAZINON	333-41-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
DIAZO DYES		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
DIBROMOETHANE	106-93-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	HERL
DIBUTYL ADENOSINE		CARCINOGENESIS	B	HERL
DIBUTYL PHTHALATE	84-74-2	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
DICHLOROACETIC ACID	79-43-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS		
		CARCINOGENESIS		
		IMMUNOLOGIC TOXICITY		
		SUBCHRONIC TOXICITY	B	HERL
DICHLOROACETONITRILE	3018-12-0	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
DICHLOROBENZENE	106-46-7	PULMONARY TOXICITY		
		SUBCHRONIC TOXICITY	D/B	HERL
1,2 DICHLOROBENZENE	95-50-1	SUBCHRONIC TOXICITY	C	HERL

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TOXICOLOGY TESTING

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
1,2 DICHLOROETHANE	107-06-2	SUBCHRONIC TOXICITY	C	HERL
2,2-DICHLOROETHENYL DIMETHYL PHOSPHATE (9C1) [VAPONA]		MUTAGENESIS/GENETIC TOXICITY	B	HERL
CIS-1,2 -DICHLOROETHYLENE	156-59-2	SUBCHRONIC TOXICITY PHARMACOKINETICS/METABOLISM	B	HERL
2,4 DICHLOROPHENOXY ACETIC ACID	94-75-7	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
2,6-DICHLORO-P-PHENYLENEDIAMINE	609-20-1	PHARMACOKINETICS/METABOLISM	B	HERL
2,3-DICHLOROPROPANOL	616-23-9	SUBCHRONIC TOXICITY	B	DYNAMAC FOR OFFICE OF SOLID WASTE
DIELDRIN	60-57-1	CARCINOGENESIS	B	HERL
DIESEL EMISSION PARTICLES		PHARMACOKINETICS/METABOLISM	B	HERL
DIETHYL [DIMETHOXYPHOSPHINYL) THIO]BUTANEDIOATE (9C1) [MALOXON]	1634-78-2	MUTAGENESIS/GENETIC TOXICITY	B	HERL
DIETHYLDITHIOCARBAMIC ACID	148-18-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
DIETHYLHEXYLPHTHALATE	117-81-7	CARCINOGENESIS	B	HERL
DIETHYLSTILBESTROL	56-53-1	MUTAGENESIS/GENETIC TOXICITY	B	HERL
DIFLUOROMETHYL ORNITHINE		IMMUNOLOGIC TOXICITY	A/B	HERL
DIHYDROXYTRYPTAMINE	5090-36-8	NEUROLOGIC/BEHAVIORAL TOXICITY	A	HERL
DIISOPROPYL FLUOROPHOSPHATE	55-91-4	NEUROLOGIC/BEHAVIORAL TOXICITY	C	HERL
DIMERCAPROL (BAL)	59-52-9	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
DIMERCAPTOSUCCINIC ACID	304-55-2	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
P-DIMETHYLAMINOAZOBENZENE	60-11-7	CARCINOGENESIS	B	HERL
DIMETHYLBENZANTHRACENE	57-97-6	MUTAGENESIS/GENETIC TOXICITY	B	HERL
DIMETHYLNITROSAMINE	62-75-9	MUTAGENESIS/GENETIC TOXICITY	B	HERL
2,4 DIMETHYLPHENOL	105-67-9	SUBCHRONIC TOXICITY	B	DYNAMAC FOR OFFICE OF SOLID WASTE
M-DINITROBENZENE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
4,6 DINITRO-O-CRESOL		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
DINOCAP		IMMUNOLOGIC TOXICITY	B	HERL
DINOSEB	88-85-1	PHARMACOLKINETICS/METABOLISM NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
DI-N-OCTYLTIN DICHLORIDE		IMMUNOLOGIC TOXICITY	A	HERL
DIPHENYL ETHERS		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
DIPROPYLAMINE	142-84-7	SUBCHRONIC TOXICITY	B	DYNAMAC FOR OFFICE OF SOLID WASTE
DIQUAT		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
2,4-DITHIOBIURET	541-53-7	NEUROLOGIC/BEHAVIORAL TOXICITY	C	HERL
DSMA(DISODIUM METHANEARSENATE)		PHARMACOKINETICS/METABOLISM	B	HERL

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TOXICOLOGY TESTING

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

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DRINKING WATER CONTAMINANTS		CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
ENDOSULFAN	115-29-7	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
EPICHLOROHYDRIN	106-89-8	SUBCHRONIC TOXICITY	C	HERL
ESTROGEN		BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	B	HERL
ETHANOL	64-17-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
ETHIDIUM BROMIDE		CARCINOGENESIS	B	HERL
ETHYL ACRYLATE	140-88-5	MUTAGENESIS/GENETIC TOXICITY	B	HERL
ETHYL ACRYLATE	140-88-5	MUTAGENESIS/GENETIC TOXICITY	B	HERL
ETHYL ALCOHOL	64-17-5	PHARMACOKINETICS/METABOLISM	A	HERL
ETHYL BENZENE	100-41-4	PULMONARY TOXICITY		
		IMMUNOLOGIC TOXICITY	D	HERL
2-ETHYLBUTYRIC ACID		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
ETHYLENE DIISOTHIOCYANATE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
ETHYLENE GLYCOL	107-21-1	SUBCHRONIC TOXICITY	B	HERL
ETHYLENE OXIDE	75-21-8	PULMONARY TOXICITY		
		IMMUNOLOGIC TOXICITY	A	HERL
ETHYL ETHER	60-29-7	SUBCHRONIC TOXICITY	A	RESEARCH TRIANGLE INSTITUTE FOR OFFICE OF SOLID WASTE
2-ETHYLHEXANOIC ACID	144-57-5	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
ETHYL METHACRYLATE	97-63-2	MUTAGENESIS/GENETIC TOXICITY	B	HERL
ETHYL METHANESULFONATE	62-50-0	MUTAGENESIS/GENETIC TOXICITY	B	HERL
ETHYLNITROSOUREA	759-73-9	MUTAGENESIS/GENETIC TOXICITY		
		CARCINOGENESIS	B	HERL
FENTHION	55-38-9	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
5-FLUORO-2-DEOXYURIDINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
P-FLUOROPHENYLALANINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
5-FLUOROURACIL	51-21-8	IMMUNOLOGIC TOXICITY	B	HERL
FOLPET		PHARMACOKINETICS/METABOLISM	B	HERL
FORMETANATE	23422-53-9	NEUROLOGIC/BEHAVIORAL TOXICOLOGY	A	HERL
GRISEOFULVIN	126-07-8	MUTAGENESIS/GENETIC TOXICITY	B	HERL
HALOACETONITRILES		CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
HALOGENATED ACETONITRILES		CARCINOGENESIS		
		PHARMACOKINETICS/METABOLISM		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL

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0261

TOXICOLOGY TESTING

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
HALOGENATED ETHANES		CARCINOGENESIS		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
HAZARDOUS AIR POLLUTANTS		PHARMACOKINETICS/METABOLISM		
		PULMONARY TOXICITY	A	HERL
HEXACHLOROBENZENE	118-74-1	PHARMACOKINETICS/METABOLISM	A	HERL
HEXACHLOROBIPHENYL		PHARMACOKINETICS/METABOLISM	B	HERL
1,2,3,4,5,6-HEXACHLOROCYCLOHEXANE (3C1) [LINDANE]	58-89-9	MUTAGENESIS/GENETIC TOXICITY	B	HERL
HEXAMETHYLENE DIAMINE - 2HC1		IMMUNOLOGIC TOXICITY	A/B	HERL
HUMIC ACID	1415-93-6	CARCINOGENESIS		
		MUTAGENESIS/GENETIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
IMINODIPROPIONITRILE	111-94-4	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
INORGANIC DRINKING WATER CONTAMINANTS		NEUROLOGIC/BEHAVIORAL TOXICITY		
LEAD		PHARMACOKINETICS/METABOLISM		
		SYSTEMIC/ORGAN TOXICITY	B	HERL
IRON CHLORIDE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
KANAMYCIN SULFATE	25389-94-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
KARATHANE		IMMUNOLOGIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B/C/D	HERL
KARATHANE		PHARMACOKINETICS/METABOLISM	C	HERL
LEAD	7439-92-1	NEUROLOGIC/BEHAVIORAL TOXICITY		
		SYSTEMIC/ORGAN TOXICITY		
		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	HERL
LINDANE	58-89-9	PHARMACOKINETICS/METABOLISM		
		MUTAGENESIS/GENETIC TOXICITY	A	HERL
LITHIUM CHLORIDE	7447-41-8	MUTAGENESIS/GENETIC TOXICITY	B	HERL
MALEIC HYDRAZIDE	123-33-1	MUTAGENESIS/GENETIC TOXICITY	B	HERL
MANGANESE CHLORIDE		IMMUNOLOGIC TOXICITY		
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
MANNITOL	69-65-8	MUTAGENESIS/GENETIC TOXICITY	B	HERL
D, L-MENTHOL	15356-70-4	MUTAGENESIS/GENETIC TOXICITY	B	HERL
MERCAPTOMERIN		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
MERCURIC CHLORIDE	7487-94-7	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
MERCURIC CHLORIDE	7487-94-7	PHARMACOKINETICS/METABOLISM	B	HERL
METHOTREXATE	59-05-2	MUTAGENESIS/GENETIC TOXICITY	B	HERL
METHOXYCHLOR		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
CIS METHRIN	35764-59-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL

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0262

ENVIRONMENTAL PROTECTION AGENCY
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CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
DELTA METHRIN	52918-63-5	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
METHYLBENZENE	108-88-3	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
METHYL [1-[(BUTYLAMINO) CARBONYL]-1H-BENZIMIDAZOL-2-YL]CARBAMATE (9C1) [BENOMYL]		MUTAGENESIS/GENETIC TOXICITY	B	HERL
2-METHYLBUTYRIC		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
METHYLCARBAMATE	598-55-0	PHARMACOKINETICS/METABOLISM	B	HERL
3-METHYLCHOLANTHENE	56-49-5	CARCINOGENESIS	B	HERL
METHYLENE CHLORIDE	75-09-2	PULMONARY TOXICITY IMMUNOLOGIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	D	HERL
METHYL MERCURIC CHLORIDE	115-09-3	NEUROLOGIC/BEHAVIORAL TOXICITY	A	HERL
METHYL MERCURY	22967-92-6	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
METHYL METHACRYLATE	80-62-6	MUTAGENESIS/GENETIC TOXICITY CARCINOGENESIS	B	HERL
METHYL METHACRYLATE	80-62-6	MUTAGENESIS/GENETIC TOXICITY	B	HERL
METHYL METHANESULFONATE	66-27-2	MUTAGENESIS/GENETIC TOXICITY CARCINOGENESIS	B	HERL
N-METHYL-N-NITROSOGUANIDINE	70-25-7	MUTAGENESIS/GENETIC TOXICITY CARCINOGENESIS	B	HERL
1-METHYL-4-PHENYL-1,2,3,6 TETRAHYDROPYRIDINE	28289-54-5	NEUROLOGIC/BEHAVIORAL TOXICITY SYSTEMIC/ORGAN TOXICITY	B	HERL
2-METHYLPYRIDINE	109-06-8	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
MIPAFOX	371-86-8	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
MITOMYCIN-C		MUTAGENESIS/GENETIC TOXICITY	B	HERL
MSMA (MONOSODIUM METHANEARSENATE)	2163-80-6	PHARMACOKINETICS/METABOLISM	B	HERL
MONOCHLOROACETIC ACID	79-11-8	SUBCHRONIC TOXICITY	B	HERL
MONOSODIUM GLUTAMATE	142-47-2	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
MONURON	150-68-5	MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
MORPHOLINE	110-91-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
MYLERAN		MUTAGENESIS/GENETIC TOXICITY	B	HERL
1-NAPHTHALENYL METHYLCARBAMATE (9C1) [SEVIN]		MUTAGENESIS/GENETIC TOXICITY	B	HERL
B-NAPHTHOFLAVONE		PHARMACOKINETICS/METABOLISM	D	HERL

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TOXICOLOGY TESTING

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OFFICE OF RESEARCH AND DEVELOPMENT

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BETA-NAPHTHYLAMINE	91-59-8	CARCINOGENESIS	B	HERL
NICKEL	7440-02-0	PHARMACOKINETICS/METABOLISM PULMONARY TOXICITY IMMUNOLOGIC TOXICITY	A	HERL
NICKEL CARBONATE		CARCINOGENESIS	B	HERL
NICKEL CHLORIDE		IMMUNOLOGIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A/B	HERL
NICKEL CHLORIDE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	RESEARCH TRIANGLE INSTITUTE FOR OFFICE OF SOLID WASTE
NICKEL DUST		CARCINOGENESIS	B	HERL
NICKEL HYDROXIDE		CARCINOGENESIS	B	HERL
NICKEL SULFATE		CARCINOGENESIS	B	HERL
NICOTINE	54-11-5	PHARMACOKINETICS/METABOLISM	B	HERL
NITROFEN	1836-75-5	REPRODUCTIVE/DEVELOPMENTAL TOXICITY MUTAGENESIS/GENETIC TOXICITY	B	HERL
NITROFEN ANALOGS		REPRODUCTIVE/DEVELOPMENTAL TOXICITY IMMUNOLOGIC TOXICITY	C	HERL
3-NITROFLUORANTHENE		CARCINOGENESIS	B	HERL
2-NITROFLUORENE	607-57-8	MUTAGENESIS/GENETIC TOXICITY	B	HERL
NITROGEN DIOXIDE	10102-44-0	CHRONIC/SUBCHRONIC TOXICITY IMMUNOLOGIC TOXICITY PULMONARY TOXICITY SYSTEMIC/ORGAN TOXICITY	B	HERL
NITROGEN DIOXIDE	10102-44-0	CHRONIC/SUBCHRONIC TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	B	HERL
NITROGEN DIOXIDE	10102-44-0	EPIDEMIOLOGY	B	HERL
2-NITRO-2-METHYLANTHRAQUINONE	129-15-7	MUTAGENESIS/GENETIC TOXICITY	C	HERL
3-NITROPROPIONIC ACID	504-88-1	MUTAGENESIS/GENETIC TOXICITY	B	HERL
1-NITROPYRENE	5522-43-0	MUTAGENESIS/GENETIC TOXICITY PHARMACOKINETICS/METABOLISM	B	HERL
4-NITROQUINONE		CARCINOGENESIS	B	HERL
ONCOVIN	2068-78-2	MUTAGENESIS/GENETIC TOXICITY	B	HERL
ORGANIC CHLORAMINES		CARCINOGENESIS	A	HERL
1,2-OXATHIOLATE-2,-2-DIOXIDE	1120-71-4	CARCINOGENESIS	B	HERL
OXYFLUORFEN		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL

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0264

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
OZONE	10028-15-6	CHRONIC/SUBCHRONIC TOXICITY IMMUNOLOGIC TOXICITY PULMONARY TOXICITY SYSTEMIC/ORGAN TOXICITY	B	HERL
OZONE	10028-15-6	CHRONIC/SUBCHRONIC/TOXICITY BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	B	HERL
OZONE	10028-15-6	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	B	HERL
OZONE	10028-15-6	EPIDEMIOLOGY	C	HERL
PARATHION	56-38-2	PHARMACOKINETICS/METABOLISM	B	HERL
PARTICULATES		IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	A	HERL
PCB		PHARMACOKINETICS/METABOLISM	B	HERL
PERCHLORETHYLENE	127-18-4	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	C	HERL
PERMETHRIN	52645-53-1	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
PERMETHRIN	52645-53-1	PHARMACOKINETICS/METABOLISM	B	HERL
PESTICIDES		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
PESTICIDES		ACUTE/CHRONIC TOXICITY NEUROLOGIC TOXICITY	B	HERL
PHENOBARBITOL	50-06-6	PHARMACOKINETICS/METABOLISM BIOCHEMICAL/CELLULAR/TISSUE EFFECTS	A	HERL
PHENYLENEDIAMINE		PHARMACOKINETICS/METABOLISM	B	HERL
PHENYLMETHANE-SULFONYL-FLUORIDE		NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
PHORBOL		CARCINOGENESIS	B	HERL
PHORBOL-12-MYISTATE-13-ACETATE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
PHOSGENE	75-44-5	PHARMACOKINETICS/METABOLISM PULMONARY TOXICITY	A	HERL
PHOSPHENE		CLINICAL TOXICOLOGY/EPIDEMIOLOGY	B	HERL
PHTHALAMIDE	88-96-0	MUTAGENESIS/GENETIC TOXICITY	B	HERL
PHTHALIC ANHYDRIDE	85-44-9	MUTAGENESIS/GENETIC TOXICITY	B	HERL
PICLORAM	1918-02-1	ACUTE/CHRONIC TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY SYSTEMIC/ORGAN TOXICITY	B	HERL
POLYCHLORINATED DIBENZODIOXINS		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL

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TOXICOLOGY TESTING

ENVIRONMENTAL PROTECTION AGENCY
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POTASSIUM SUPEROXIDE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
PRIORITY AIR POLLUTANTS		NEUROLOGIC/BEHAVIORAL TOXICITY	A	HERL
PRIORITY AIR POLLUTANTS		CARCINOGENESIS MUTAGENESIS/GENETIC TOXICITY SYSTEMIC/ORGAN TOXICITY PULMONARY TOXICITY	B	HERL
PROCARBAZINE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
PROCARBAZINE HYDROCHLORIDE	366-70-1	MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
PROFLAVINE		MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
PROPARGYL ALCOHOL		SUBCHRONIC TOXICITY	B	DYNAMAC FOR OFFICE OF SOLID WASTE
BETA-PROPIOLACTONE	57-57-8	CARCINOGENESIS	B	HERL
PYRETHROIDS (VARIOUS)		NEUROLOGIC/BEHAVIORAL TOXICITY	A	HERL
PYRIDINE	110-86-1	SUBCHRONIC TOXICITY	A	DYNAMAC FOR OFFICE OF SOLID WASTE
QUINACRINE MUSTARD DIHYDROCHLORIDE		MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
RADON	10043-92-2	EPIDEMIOLOGY	B	HERL
RESERPINE	50-55-5	MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
RETINOIC ACID	302-79-4	CARCINOGENESIS	B	HERL
SACCHARIN, SODIUM SALT		MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
SELENIUM SULFIDE	7446-34-6	MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
SIDE STREAM SMOKE		NEUROLOGIC/BEHAVIORAL TOXICITY	D	HERL
SILVER	7440-22-4	CARCINOGENESIS	A	HERL
SODIUM AZIDE	26628-22-8	MUTAGENESIS/GENETIC TOXICOLOGY	B	HERL
SODIUM SALICYLATE	54-21-7	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
STYRENE	100-42-5	PULMONARY TOXICITY	B	HERL
		REPRODUCTIVE/DEVELOPMENTAL TOXICITY NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
STYRENE OXIDE	96-09-5	PULMONARY TOXICITY	D	HERL
STYRENE OXIDE	96-09-3	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
SULFOLENE	126-33-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
SULFUR DIOXIDE	7446-09-5	IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	B	HERL
SULFUR DIOXIDE	7446-09-5	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	B	HERL
SULFUR DIOXIDE	7446-09-5	EPIDEMIOLOGY CHRONIC/SUBCHRONIC TOXICITY	B	HERL

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TOXICOLOGY TESTING

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SULFURIC ACID	7664-93-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS IMMUNOLOGIC TOXICITY PULMONARY TOXICITY	B	HERL
TETRACHLOROETHYLENE	127-18-4	CARCINOGENESIS PULMONARY TOXICITY PHARMACOKINETICS/METABOLISM	B	HERL
2,3,7,8-TETRACHLOROPHENOL		SUBCHRONIC TOXICITY	A	DYNAMAC FOR OFFICE OF SOLID WASTE
TETRAHYDROFURAN	109-99-9	SUBCHRONIC TOXICITY	B	HERL
THALLIUM	7440-28-0	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
6-THIOGUANINE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
THIOPHENOL		SUBCHRONIC TOXICITY	B	DYNAMAC FOR OFFICE OF SOLID WASTE
TOLUENE	108-88-3	NEUROLOGIC/BEHAVIORAL TOXICITY PULMONARY TOXICITY	B	HERL
O-TOLUIDINE	95-53-4	CARCINOGENESIS	B	HERL
TOXAPHENE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
TRIADIMEFON	43121-43-3	NEUROLOGIC/BEHAVIORAL TOXICITY	A	HERL
TRIADIMENOL	55219-65-3	NEUROLOGIC/BHEAVIORAL TOXICITY	B	HERL
BIS-TRIBUTYL TIN OXIDE	56-35-9	NEUROLOGIC/BEHAVIORAL TOXICITY PULMONARY TOXICITY SYSTEMIC/ORGAN TOXICITY	B/D	HERL
TRICHLOROACETIC ACID	76-03-9	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS CARCINOGENESIS IMMUNOLOGIC TOXICITY SUBCHRONIC TOXICITY	B	HERL
TRICHLOROACETONITRILE	545-06-2	BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PHARMACOKINETICS/METABOLISM	C	HERL
1,2,3-TRICHLOROBENZENE	87-61-6	SUBCHRONIC TOXICITY	B	DYNAMAC FOR OFFICE OF SOLID WASTE
TRICHLOROETHANE	71-55-6	PULMONARY TOXICITY	D	HERL
TRICHLOROETHYLENE	79-01-6	CARCINOGENESIS BIOCHEMICAL/CELLULAR/TISSUE EFFECTS PULMONARY TOXICITY PHARMACOKINETICS/METABOLISM	B/D	HERL
2,4,5-TRICHLOROPHENOL	95-95-4	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
2,4,6-TRICHLOROPHENOL	88-06-2	SUBCHRONIC TOXICITY	C	HERL
2,4,6-TRICHLOROPHENOL-4'NITROPHENYL ETHER		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
1,2,3-TRICHLOROPROPANE	96-18-4	SUBCHRONIC TOXICITY	B	HERL
1,1,1-TRICHLOROPROPANONE		SUBCHRONIC TOXICITY	C	HERL

TEST STATUS CODE: A = TEST TO BE COMPLETED IN FY 1987 - B = ON TEST IN FY 1987
C = TEST TO BE STARTED IN FY 1987 - D = SELECTED FOR TEST, DATE NOT DETERMINED

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

CHEMICAL	CAS NO.	TEST TYPE	STATUS	PERFORMING ORGANIZATION/PROJECT NO.
TRIETHYLTIN	2767-54-6	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
TRIFLUOROTHYMIDINE	70-00-8	MUTAGENESIS/GENETIC TOXICITY	B	HERL
TRIMETHYLQUINOLINE		PHARMACOKINETICS/METABOLISM	B	HERL
TRIMETHYLTIN	56-24-6	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
TRIORTHOCRESYL-PHOSPHATE	78-30-8	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
TRIPHENYLPHOSPHITE	101-02-0	NEUROLOGIC/BEHAVIORAL TOXICITY	A	HERL
TRIPHENYLTIN	639-58-7	NEUROLOGIC/BEHAVIORAL TOXICITY REPRODUCTIVE/DEVELOPMENTAL TOXICITY	B	HERL
TRYPAN BLUE		REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
URANIUM-238		PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	B	HERL
URETHANE	51-79-6	MUTAGENESIS/GENETIC TOXICITY	B	HERL
VALERIC ACID	59546E104	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
VALPROIC ACID	59546E104	REPRODUCTIVE/DEVELOPMENTAL TOXICITY	A	HERL
VINYL CARBAMATE		MUTAGENESIS/GENETIC TOXICITY	B	HERL
VOLATILE ORGANIC DRINKING WATER CONTAMINANTS		NEUROLOGIC/BEHAVIORAL TOXICITY PHARMACOKINETICS/METABOLISM SYSTEMIC/ORGAN TOXICITY	A	HERL
WOOD STOVE EMISSIONS		PULMONARY TOXICITY	D	HERL
XYLENES	1330-20-7	SUBCHRONIC TOXICITY SYSTEMIC/ORGAN TOXICITY NEUROLOGIC/BEHAVIORAL TOXICITY PULMONARY TOXICITY	C	HERL
M-XYLENE	108-38-3	NEUROLOGIC/BEHAVIORAL TOXICITY	B	HERL
P-XYLENE	106-42-3	NEUROLOGIC/BEHAVIORAL TOXICITY PULMONARY TOXICITY	B	HERL

Chemical Index by Name

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
ACENAPHTHENE	83-32-9	16
ACETALDEHYDE	75-07-0	24
ACETALDOXIME	107-29-9	2
2-ACETAMIDOFLUORENE		106
ACETAMINOPHEN	103-90-2	24
ACETAMINOPHEN	103-90-2	39
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	73
ACETAMINOPHEN	103-90-2	81
ACETAMINOPHEN	103-90-2	97
ACETIC ACID	64-19-7	39
ACETIC ACID	64-19-7	16
ACETOETHYLTETRAMETHYLTETRALIN		44
ACETOETHYLTETRAMETHYLTETRALIN		44
ACETOHEXAMIDE	968-81-0	39
ACETOHEXAMIDE	968-81-0	16
ACETOLAMIDE		47
ACETONE	67-64-1	12
ACETONE	67-64-1	24
ACETONE	67-64-1	33
ACETONITRILE	75-05-8	33
ACETOPHENETIDIN	62-44-2	71
N-ACETOXY-2-ACETYLAMINOFLUORENE	6098-44-8	47
N-ACETOXY-N-ACETYL-1-AMINOPYRENE		47
N-ACETOXY-AMINOFLUORENE		47
N-ACETOXY-AMINOFLUORENE		47
N-ACETOXY-N-TRIFLUOROACETYL-4-AMINOBIPHENYL		47
ACETOZOLAMIDE		64
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	106
(3H)-N-ACETYL-2-AMINOFLUORENE		47
4-ACETYLAMINOFLUORENE	28322-02-3	39
N-ACETYL-2-AMINOFLUORENE	53-96-3	47
2-ACETYLAMINO-4-METHYLPHENOL	6375-17-3	16
N-ACETYL-1-AMINOPYRENE		47
N-ACETYLBENZIDINE	3366-61-8	47
N-ACETYL-P-BENZOQUINONEIMINE	50700-49-7	47
ACETYLCHOLINE	51-84-3	85
ACETYLCHOLINE	51-84-3	85
ACETYLCHOLINE	51-84-3	93
N-ACETYL-N-HYDROXY-2-AMINOFLUORENE	30651-40-2	47
N-ACETYL-N-HYDROXY-1-AMINOPYRENE		47
3-ACETYLPYRIDINE	350-03-8	106
4-ACETYL PYRIDINE	1122-54-9	16
4-ACETYL PYRIDINE	1122-54-9	24
N4-ACETYLSULFAMETHAZINE	100-90-3	47
N4-ACETYLSULFAMETHAZINE	100-90-3	47
N-ACETYL-P-TOLUIDINE	103-89-9	16
ACID ORANGE NO. 3	6373-74-6	33
ACIFLUORFEN		106
ACROLEIN	107-02-8	68
ACROLEIN	107-02-8	68
ACROLEIN	107-02-8	106
ACRYLAMIDE	79-06-1	24
ACRYLAMIDE	79-06-1	30
ACRYLAMIDE	79-06-1	73
ACRYLAMIDE	79-06-1	87
ACRYLAMIDE	79-06-1	106
ACRYLIC ACID ESTERS		12
ACRYLONITRILE	107-13-1	11
ACTINOMYCIN D	50-76-0	47
ACYCLOUIR+DERIVATIVES	59277-89-3	79
ACYCLOVIR	59277-89-3	79
ACYCLOVIR	59277-89-3	79
ADENINE ARABINOSIDE (ARA-A)	5536-17-4	79
ADENINE ARABINOSIDE (ARA-A)	5536-17-4	79
ADENINE NUCLEOTIDES		85
ADENOSINE TRIPHOSPHATE	56-65-6	83
S-ADENOSYL-L-METHIONINE ANALOGS		79
ADRIAMYCIN	23214-92-8	66
ADRIAMYCIN	23214-92-8	68
ADRIAMYCIN	23214-92-8	72
ADRIAMYCIN	23214-92-8	72
ADRIAMYCIN	23214-92-8	97
ADRIAMYCIN	23214-92-8	97
ADRIAMYCIN	23214-92-8	106
AEROSOLS		68
AFLATOXIN	1402-68-2	44
AFLATOXIN	1402-68-2	44
AGARITINE	2757-90-6	16
ALCOHOL	64-17-5	85
ALCOHOL		97
ALCOHOL, CAFFEINE, DRUGS		59
ALDRIN	309-00-2	16
ALIPHATIC NITRILES		66
ALKALOIDS		96
ALKYLATING AGENTS		105
ALLETHRIN	584-79-2	85
ALLOPUMILIOTOXIN		73
ALLOXAN		97

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
ALLYL ALCOHOL	107-18-6	106
ALLYLAMINE (ALIPHATIC AMINES)	107-11-9	66
ALLYL CHLORIDE	107-05-1	47
ALLYL GLYCIDYL ETHER	106-92-3	39
ALLYL GLYCIDYL ETHER	106-92-3	33
ALLYL UREA	557-11-9	39
ALUMINUM	7429-90-5	56
ALUMINUM	7429-90-5	81
ALUMINUM COMPOUNDS NEUROTOXINS		85
AMIDES, ACRYLAMIDES		93
AMIKACIN		97
AMILORIDE HCL	2016-88-8	16
9-AMINOACRIDINE		106
9-AMINOACRIDINE HYDROCHLORIDE	134-50-9	33
2-AMINOBENZENESULFONIC ACID	88-21-1	16
6-AMINOBENZO(A)PYRENE	7428-83-3	47
(3H)4-AMINOBIPHENYL		47
4-AMINOBIPHENYL	92-67-1	47
4-AMINOBIPHENYL	92-67-1	47
4-AMINOBIPHENYL	92-67-1	106
4-AMINOBIPHENYL	92-67-1	106
GAMMA-AMINOBUTYRIC ACID		89
GAMMA-AMINOBUTYRIC ACID		93
2-AMINO-4-CHLORO-6-NITROPHENOL	6358-08-3	16
2-AMINO-4-CHLOROPHENOL	95-85-2	16
6-AMINOCHRYSENE	2642-98-0	47
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	24
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	39
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	33
2-AMINO-4,6-DICHLOROPHENOL	527-62-8	16
3-AMINO-4-ETHOXYACETANILIDE	17026-81-2	24
3-AMINO-9-ETHYLCARBAZOLE	6109-97-3	24
2-AMINOFLUORENE	153-78-6	48
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		85
1-AMINO-2-METHYLANTHRAQUINONE	82-28-0	24
1-AMINO-2-METHYLANTHRAQUINONE	82-28-0	106
3-AMINO-4-METHYLPHENOL	2836-00-2	16
2-AMINO-3-NITRO-4-METHYLPHENOL	6265-05-0	16
2-AMINO-5-NITRO-4-METHYLPHENOL	6265-06-1	16
2-AMINO-4-NITROPHENOL	99-57-0	33
2-AMINO-5-NITROPHENOL	121-88-0	33
4-AMINO-2-NITROPHENOL	119-34-6	24
2-AMINO-6-NITRO-1-PHENOL-4-SULFONIC	96-93-5	16
2-AMINO-5-NITROTHIAZOLE	121-66-4	24
2-(4-AMINOPHENYL)-6-METHYL-7BENZOTHIAZOLE	130-17-6	33

CHEMICAL	CAS NO.	PAGE
1-AMINOPYRENE	1606-67-3	48
(3H)-1-AMINOPYRENE		48
3-AMINOPYRENOL		48
6-AMINOPYRENOL		48
8-AMINOPYRENOL		48
3-AMINOPYRIDINE	79-06-1	106
AMINOPYRIDINES		85
3-AMINO-5-SULFOSALICYLIC ACID	6201-86-1	16
2-AMINO-4-THIAZOLEACETIC ACID	29676-71-9	16
5'-AMINOTHYMIDINE		79
3-AMINOTRIAZOLE	61-82-5	39
2-AMINO-3,4,6-TRICHLOROPHENOL	6358-15-2	16
AMITRAZ	33089-61-1	106
AMMONIUM SULFATE	7783-20-2	106
AMPHETAMINE	300-62-9	56
AMPHETAMINE	300-62-9	48
AMPHETAMINE SULFATE	60-13-9	24
AMPHETAMINE SULFATE	60-13-9	30
AMPHETAMINE SULFATE	60-13-9	39
DL-AMPHETAMINE SULFATE	60-13-9	33
AMPHOTERICIN B	1397-69-3	16
AMPHOTERICIN B	1397-89-3	24
AMPHOTERICIN B	1397-89-3	106
AMSONIC ACID		14
ANALGESICS		73
ANESTHETICS		73
ANESTHETICS		83
ANESTHETICS		91
ANESTHETICS, LOCAL		87
ANESTHETICS, LOCAL		90
ANESTHETICS, LOCAL		91
ANESTHETICS, LOCAL		92
ANESTHETICS, LOCAL		93
ANILINE		71
P-ANISIDINE HYDROCHLORIDE	20265-97-8	39
ANSIOMYCIN		79
ANSIOMYCIN		79
ANSIOMYCIN		79
ANSIOMYCIN		79
ANTHOPLEURIN-A	60880-63-9	85
ANTHRACENE	120-12-7	66
ANTHRACYCLINE ADRIAMYCIN	23214-92-8	66
2-ANTHRAMINE		106
ANTIBIOTICS		85
ANTIBIOTICS		85
ANTIBIOTICS		85
ANTIBIOTICS, ADRIAMYCIN		85
ANTIBIOTICS, ADRIAMYCIN	23214-92-8	93

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
ANTIBIOTICS, AMINOGLYCOSIDE		85
ANTIBIOTICS, OLIGOMYCIN		94
ANTIBIOTICS (PENICILLIN)		87
ANTICONVULSANTS		83
ANTICONVULSANTS		84
ANTICONVULSANTS		84
ANTICONVULSANTS		88
ANTICONVULSANTS		91
ANTICONVULSANTS		91
ANTICONVULSANTS		91
ANTICONVULSANTS		91
ANTICONVULSANTS		91
ANTICONVULSANTS		92
ANTICONVULSANTS		92
ANTICONVULSANTS		94
ANTIMONY POTASSIUM TARTRATE	28300-74-5	16
ANTIMONY POTASSIUM TARTRATE	28300-74-5	33
ANTISICKLING AGENTS		71
ANTITRYPANOSOMAL COMPOUNDS		73
APOMORPHINE	58-00-4	86
APPETITE SUPPRESSANTS		73
AROCHLOR		106
AROCHLOR 1254	11097-69-1	48
AROCLOR 1254	11097-69-1	24
AROMATIC AMINES		105
AROMATIC HYDROCARBONS		11
AROMATIC HYDROCARBONS		11
AROMATIC HYDROCARBONS		11
ARSENIC	7440-38-2	106
ARSENIC	7440-38-2	81
ARSENIC (COMPOUNDS)		89
ARSINE		12
ARTIFICIAL FOOD DYES		83
ASBESTOS	1332-21-4	68
ASBESTOS	1332-21-4	106
ASCORBIC ACID	50-81-7	44
L-ASCORBIC ACID	50-81-7	30
ASPHALTIC BASED PAINTS		106
ATP	56-65-5	86
ATRAZINE	1912-24-9	106
AUTOMOBILE EXHAUST		68
AZACHOLESTEROL COMPOUNDS		86
5-AZACYTIDINE	320-67-2	16
5-AZACYTIDINE	320-67-2	106
5-AZACYTIDINE	320-67-2	106
5-AZA-2'-DEOXYCYTIDINE	2353-33-5	39
8-AZAGUANINE		106
AZATHIOPRINE	446-86-6	16
AZATHIOPRINE	446-86-6	81
6-AZAURACIL	461-89-2	83
AZIDOTHYMIDINE		79
AZINPHOS-METHYL	86-50-0	106
AZINPHOSMETHYL	86-50-0	24
AZIRIDINYLBENZOQUINONE		106
AZOCYTOSINEARABINOSIDE		8
AZOCYTOSINEARABINOSIDE		6
AZODICARBONAMIDE	123-77-3	33
AZODICARBONAMIDE	123-77-3	24
AZOXYETHANE		2
AZOXYMETHANE		2
AZOXYMETHANE	25843-45-2	16
BACTERIAL ENDOTOXIN		73
BACTERIAL ENDOTOXIN		86
BACTERIAL ENDOTOXINS METALS, HEAVY METALS, COPPER (COMPOUNDS)		
BAPIVACAINE	2180-92-9	73
BARBITURATES		73
BARBITURATES		86
BARBITURATES		91
BARIUM	10361-37-2	106
BARIUM CHLORIDE DIHYDRATE	10326-27-9	16
BARIUM CHLORIDE DIHYDRATE	10326-27-9	33
BARIUM LITHOL	1103-38-4	6
BARIUM LITHOL	1103-38-4	8
BATRACHOTOXININ A	19457-37-5	73
BENOMYL	17804-35-2	106
BENZ(1)ACEANTHRYLENE		106
BENZ(C)ACRIDINE	225-51-4	74
BENZALDEHYDE	100-52-7	33
BENZANTHRACENE	56-55-3	48
BENZANTHRACENE	56-55-3	74
BENZ(A)ANTHRACENE	56-55-3	107
BENZENE	71-43-2	14
BENZENE	71-43-2	107
BENZENE	71-43-2	30
BENZENESULFONAMIDE,4-AMINO-N[5-CHLORO-2-QUINOXALINYL)](NSC-339004)		10
BENZETHONIUM CHLORIDE	121-54-0	33
BENZIDINE	92-87-3	12
BENZIDINE	92-87-5	30
BENZIDINE	92-87-5	48
BENZIDINE	92-87-5	107
BENZODIAZEPINE		74
BENZODIAZEPINES		93
BENZODIAZEPINES		103
BENZO(B)FLUORANTHENE	205-99-2	16

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
BENZO(K)FLUORANTHENE	207-08-9	16
BENZOFURAN	271-89-6	33
BENZOIC ACID	65-85-0	74
BENZOIN	119-53-9	30
BENZONITRILE	100-47-0	24
BENZONITRILE	100-47-0	33
BENZOPYRANS		83
BENZO(A)PYRENE	50-32-8	24
BENZO(A)PYRENE	50-32-8	48
BENZO(A)PYRENE	50-32-8	48
BENZO(A)PYRENE	50-32-8	48
BENZO(A)PYRENE	50-32-8	74
BENZO(A)PYRENE	50-32-8	74
BENZO(A)PYRENE		105
BENZO(A)PYRENE	50-32-8	107
1,2,3-BENZOTRIAZOLE	95-14-7	16
BENZOYL CHLORIDE	98-88-4	16
BENZOYL CHLORIDE	98-88-4	33
N-BENZOYLOXY-N-METHYL-4-AMINOBENZENE		48
BENZYL ACETATE	140-11-4	11
BENZYL ACETATE	140-11-4	33
BENZYL ACETATE	140-11-4	107
BENZYL ALCOHOL	100-51-6	33
BENZYL ALCOHOL		72
BENZYL CHLORIDE	100-44-7	24
O-BENZYL-P-CHLOROPHENOL	120-32-1	33
O-BENZYL-P-CHLOROPHENOL	120-32-1	39
BENZYL SULFIDE	538-74-9	16
BERYLLIUM	7440-41-7	68
BERYLLIUM SULFATE TETRAHYDRATE	7787-56-6	16
BIFENOX		107
BILIRUBIN	635-65-4	72
BISBENZIMIDE		107
2,2-BIS(BROMOMETHYL)-1,3-PROPANEDIOL	3296-90-0	33
N,N'-BIS(1,4-DIMETHYLPENTYL)P-PHENYLENEDIAMINE	3081-14-9	24
BISPHENOL A	80-05-7	30
BISPHENOL A DIGLYCIDYL ETHER	1675-54-3	24
BIS-(THIOACETOXYL)AURATE(I)		86
BIS-TRIBUTYL TIN OXIDE	56-35-9	117
(4,4'-BITHIAZOLE)-2,2'-DIAMINE	58139-59-6	16
BLEOMYCIN	11056-06-7	68
BOTULINUM TOXIN		86
BROMOBENZENE	108-86-1	33
BROMOBENZENE	108-86-1	33
BROMOBENZENE	108-86-1	39
BROMOBENZENE	108-86-1	74
BROMOBENZENE	108-86-1	107
5-BROMO-2-DEOXYURIDINE		107
2-BROMO-4,6-DINITROANILINE	1817-73-8	33
2-BROMO-4,6-DINITROANILINE	1817-73-8	33
BROMOFORM	75-25-2	12
BROMOFORM	75-25-2	33
BETA-BROMO-BETA-NITROSTYRENE	7166-19-0	14
BETA-BROMO-BETA-NITROSTYRENE	7166-19-0	16
P-BROMOPHENYLACETYLUREA		65
BROMOPICRIN	464-10-8	16
BRUCINE	357-57-3	107
BUNGAROTOXIN	37209-28-2	86
BUNGAROTOXIN	37209-28-2	86
BUNGAROTOXIN		87
BUNGAROTOXIN		87
BUNGAROTOXIN		87
BUNGAROTOXIN	37209-28-2	93
BUNGAROTOXIN	37209-28-2	93
ALPHA BUNGAROTOXIN	11023-79-4	83
BETA-BUNGAROTOXIN	12778-32-4	86
BUPIVACAINE		97
BUPROPION		63
1,3-BUTADIENE	106-99-0	14
1,3-BUTADIENE	106-99-0	16
1,3-BUTADIENE	106-99-0	24
1,3-BUTADIENE	106-99-0	30
1,3-BUTADIENE	106-99-0	33
1,3-BUTADIENE	106-99-0	39
BUTANAL OXIME	110-69-0	6
N-BUTANE	106-97-8	16
N-BUTANE	106-97-8	24
N-BUTANE	106-97-8	30
TERT-BUTANOL	75-65-0	58
2-BUTANONE, OXIME	96-29-7	6
2-BUTANONE PEROXIDE	1338-23-4	33
L-BUTHIONINE SULFOXIMINE		10
4-BUTOXYBENZYL-4-ETHYLANILINE	29733-15-5	17
2-BUTOXYETHANOL	111-76-2	24
2-BUTOXYETHANOL	111-76-2	12
2-BUTOXYETHANOL	111-76-2	12
2-(2-BUTOXYETHOXY)ETHYLTHIOCYANATE	112-56-1	39
N-BUTYL ACETATE	123-86-4	48
N-BUTYL ACRYLATE	141-32-2	24
N-BUTYL ACRYLATE	141-32-2	30
N-BUTYL ACRYLATE	141-32-2	48
T-BUTYL ALCOHOL	75-65-0	33
T-BUTYLATED HYDROXY-ANISOL (BHA)		97
BUTYLATED HYDROXYTOLUENE	128-37-0	107
T-BUTYLATED HYDROXYTOLUENE (BHT)	128-37-0	97
BUTYL BENZYL PHTHALATE	85-68-7	33

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
N-BUTYLCYCLOHEXANE		60
T-BUTYLHYDROQUINONE	1948-33-0	17
T-BUTYLHYDROQUINONE	1948-33-0	24
TERT-BUTYL PERBENZOATE	614-45-9	33
BUTYRALDEHYDE	123-72-8	33
BUTYRIC ACID	107-92-6	17
BUTYRIC ACID	107-92-6	107
BUTYRIC ACID	107-92-6	39
N-BUTYRIC ACID, METHYL ESTER	623-42-7	39
GAMMA-BUTYROLACTONE	96-48-0	33
GAMMA-BUTYROLACTONE	96-48-0	39
BUTYRYL CHLORIDE	141-75-3	17
CACODYLIC ACID	75-60-5	107
CADMIUM	7440-43-9	44
CADMIUM	7440-43-9	107
CADMIUM CHLORIDE	10108-64-2	44
CADMIUM CHLORIDE	10108-64-2	107
CADMIUM METALLOTHIONEN		44
CADMIUM SULFATE	10124-36-4	107
CADMIUM SULFIDE		97
CAFFEINE	58-08-2	44
CAFFEINE	58-08-2	44
CAFFEINE	58-08-2	64
CAFFEINE	58-08-2	107
CALCIUM CHANNEL BLOCKERS		12
CALCIUM CHROMATE	13765-19-0	39
CALCIUM CHROMATE	13765-19-0	107
CALCIUM CYANAMIDE	156-62-7	39
CAPROIC ACID	142-62-1	39
CAPROLACTAM	105-60-2	30
CAPRYLIC ACID		107
CAPSAICIN	404-86-4	107
CAPTAN		107
CAPTAN	133-06-2	24
CARBACHOL	51-83-2	86
CARBAMAZEPINE	298-46-4	84
CARBAMAZEPINE	298-46-4	86
CARBAMAZEPINE	298-46-4	86
CARBARSONE	121-59-5	17
CARBARYL	63-25-2	107
CARBARYL	63-25-2	107
CARBENDAZIM		107
CARBENDAZIM	10605-21-7	24
CARBOFURAN		107
CARBON	7440-44-0	88
CARBON	7440-44-0	87
CARBON DIOXIDE		64
CARBON DISULFIDE	75-15-0	24

CHEMICAL	CAS NO.	PAGE
CARBON MONOXIDE	630-08-0	107
CARBON MONOXIDE	630-08-0	107
CARBON TETRACHLORIDE	56-23-5	24
CARBON TETRACHLORIDE	56-23-5	30
CARBON TETRACHLORIDE	56-23-5	74
CARBON TETRACHLORIDE	56-23-0	107
CARBOPLATIN		102
CARBOXYLIC ACID		60
CARBOXYLIC ACIDS NEUROPHARMACOLOGICAL AGENTS ANTICONVULSANTS		87
CARBROMAL	77-65-6	39
CARCINOGENS		74
CARCINOGENS		81
CARISOPRODOL	78-44-4	24
CARISOPRODOL	78-44-4	33
CARMINIC ACID	1260-17-9	17
D-CARVONE	2244-16-8	33
D-CARVONE	2244-16-8	24
D-CARVONE	2244-16-8	39
CASTOR OIL	8001-79-4	24
CASTOR OIL	8001-79-4	34
CATECHOLAMINES		86
CATECHOLAMINES		90
CATECHOLAMINES, L-HYDROXYDOPAMINE		92
CEPHEMS		87
CHEMICAL PROMUTAGENS		11
CHLORAMBUCIL	305-03-3	108
CHLORAMINE	10599-90-3	34
CHLORAMINE	10599-90-3	108
CHLORAMINE	10599-90-3	108
CHLORAZOL BLACK		108
CHLORDANE	12789-03-6	24
CHLORDANE	57-74-9	108
CHLORDECONE (KEPONE)	143-50-0	108
CHLORDECONE (KEPONE)	143-50-0	39
CHLORDIMEFORM	6164-98-3	108
CHLORENDIC ACID	115-28-6	24
CHLORINATED PARAFFINS: C12, 60% CHLORINE	63449-39-8	25
CHLORINATION BI-PRODUCTS		108
CHLORINE (CHLORINATED DRINKING WATER)	7990-92-3	108
CHLORINE DIOXIDE	10049-04-4	108
CHLORINE DIOXIDE	10049-04-4	108
CHLORINE GAS	7782-50-5	68
CHLOROACETIC ACID	79-01-7	108
CHLOROACETOPHENONE	532-27-4	34
CHLOROACETOPHENONE (CN)	532-27-4	25
CHLOROACETOPHENONE (CN)	532-27-4	39
4-(CHLOROACETYL)ACETANILIDE	140-49-8	17

CHEMICAL	CAS NO.	PAGE
4-(CHLOROACETYL)ACETANILIDE	140-49-8	39
N-(3-CHLOROALLYL)HEXAMINIUM CHLORIDE	4080-31-3	14
N-(3-CHLOROALLYL)HEXAMINIUM CHLORIDE	4080-31-3	17
O-CHLOROANILINE	95-51-2	39
M-CHLOROANILINE	108-42-9	39
P-CHLOROANILINE	106-47-8	39
P-CHLOROANILINE	106-47-8	34
2-CHLOROBENZALDEHYDE	89-98-5	17
4-CHLOROBENZALDEHYDE	104-88-1	17
O-CHLOROBENZALMALONITRILE	2698-41-1	34
CHLOROBENZENE	108-90-7	108
CHLOROBENZILATE	510-15-6	39
O-CHLOROBENZOIC ACID	118-91-2	17
M-CHLOROBENZOIC ACID	535-80-8	17
P-CHLOROBENZOIC ACID	74-11-3	17
4-CHLORO-O-CRESOL	1570-64-5	17
4-CHLORO-M-CRESOL	59-50-7	17
2-CHLOROETHYLTRIMETHYLAMMONIUM CHLORIDE	999-81-5	39
CHLOROFORM	67-66-3	108
3-CHLORO-2-METHYLPROPENE	563-47-3	30
2-CHLOROMETHYLPYRIDINE HYDROCHLORIDE	6959-47-3	39
3-CHLOROMETHYLPYRIDINE HYDROCHLORIDE	6959-48-4	40
1-CHLORONAPTHALENE	90-13-1	17
2-CHLORONAPTHALENE	91-58-7	17
4-CHLORO-2-NITROANILINE	89-63-4	34
2-CHLORO-2-NITROPROPANE	594-71-8	17
2-CHLOROPHENOL	95-57-8	109
4-CHLORO-O-PHENYLENEDIAMINE	95-83-0	30
4-CHLORO-M-PHENYLENEDIAMINE	5131-60-2	30
2-CHLORO-P-PHENYLENEDIAMINE SULFATE	61702-44-1	30
2-CHLORO-P-PHENYLENEDIAMINE SULFATE	61702-44-1	40
CHLOROPICRIN	76-06-2	25
CHLOROPICRIN	76-06-2	109
CHLOROPRENE	126-99-8	25
CHLOROPRENE	126-99-8	30
CHLOROPRENE	126-99-8	34
CHLOROPROCAINE		90
CHLOROPROMAZINE	50-53-3	81
1-CHLORO-2-PROPANOL	127-00-4	14
2-CHLORO-1-PROPANOL	78-89-7	17
2-CHLORO-1-PROPANOL + 1-CHLORO-2-PROPANOL		34
CHLOROTHIOFORMIC ACID	EMTDP-49	17
P-CHLOROTOLUENE	106-43-4	17
3-CHLORO-P-TOLUIDINE	95-74-9	30
3-CHLORO-P-TOLUIDINE	95-74-9	40
4-CHLORO-O-TOLUIDINE HYDROCHLORIDE	3165-93-3	30
5-CHLOROURACIL		109
CHLOROWAX 40	63449-39-8	48
CHLOROWAX 500C	63449-39-8	48
CHLORPROMAZINE	50-53-3	87
CHLORPYRIFOS		109
CHLORSULFAQUINOXALINE	98-56-6	6
CHLORSULFAQUINOXALINE	98-56-6	8
CHOLERA TOXIN		74
CHOLERA TOXIN		74
CHOLERA TOXIN ADENINE NUCLEOTIDES		83
CHOLESTEROL	57-88-5	87
CHOLESTEROL OXIDES		44
CHOLINE		93
CHOLINE, ACETYCHOLINE		87
CHOLINE, ACETYLCHOLINE		87
CHOLINE, ACETYLCHOLINE		87
CHOLINE, ACETYLCHOLINE		87
CHOLINE, CARBACHOL		87
CHRYSOTILE	12000-29-5	58
CHRYSOTILE(MODIFIED)		58
CHRYSOTILE(MODIFIED)		58
C.I. ACID ORANGE 3	6373-74-6	25
C.I. ACID ORANGE 3	6373-74-6	40
C.I. ACID ORANGE 10	1936-15-8	30
C.I. ACID ORANGE 10	1936-15-8	40
C.I. ACID RED 14	3567-69-9	30
C.I. ACID RED 114	6459-94-5	40
C.I. ACID RED 114	6459-94-5	34
C.I. DIRECT BLACK 38	1937-37-7	25
C.I. DIRECT BLACK 114	61703-05-7	17
C.I. DIRECT BLUE 15	2429-74-5	34
C.I. DIRECT BLUE 15	2429-74-5	40
C.I. DIRECT BLUE 218	28407-37-6	34
C.I. DIRECT BLUE 218	28407-37-6	40
C.I. DIRECT ORANGE 6	6637-88-3	17
C.I. DIRECT YELLOW 11	1325-37-7	34
C.I. DISPERSE BLUE 1	2475-45-8	25
C.I. DISPERSE YELLOW 3	2832-40-8	30
C.I. FOOD BLACK 1	2519-30-4	6
C.I. FOOD BLACK 1	2519-30-4	8
C.I. PIGMENT RED 2	6041-94-7	17
C.I. PIGMENT RED 3	2425-85-6	25
C.I. PIGMENT RED 3	2425-85-6	34
C.I. PIGMENT RED 3	2425-85-6	40
C.I. PIGMENT RED 23	6471-49-4	25
C.I. PIGMENT RED 23	6471-49-4	34
C.I. PIGMENT RED 81	12224-98-5	17
C.I. SOLVENT YELLOW 14	842-07-9	30
C.I. VAT YELLOW 4	128-66-5	25
C.I. VAT YELLOW 4	128-66-5	40

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
1,8-CINEOLE	470-82-6	48
1,8-CINEOLE	470-82-6	48
1,8-CINEOLE	470-82-6	48
CINNAMALDEHYDE	104-55-2	48
CINNAMALDEHYDE	104-55-2	48
TRANS-CINNAMALDEHYDE	14371-10-9	40
CITRAL	5392-40-5	12
CITRIC ACID	77-92-9	40
CITRININ	518-75-2	44
CLOMID		59
CLOMIPHENE CITRATE		59
CLONIDINE		48
CLONIDINE		62
CLONITRALID	1420-04-8	17
COAGULANTS, COAGULANT AIDS		109
COAL LIQUEFACTION MATERIALS		105
COAL TAR		109
COBALT CHLORIDE		109
COBALT SULFATE HEPTAHYDRATE	10026-24-1	17
COBALT SULFATE HEPTAHYDRATE	10026-24-1	34
COCONUT DIETHANOLAMIDE	68603-42-9	25
COCONUT DIETHANOLAMIDE	68603-42-9	40
COCONUT OIL ACID (2 PARTS)-DIETHANOLAMINE	68603-42-9	34
CODEINE	76-57-3	34
COFFEE DUST		68
COLCHICINE	64-86-8	87
COLCHICINE	64-86-8	88
COLCHICINE	64-86-8	109
COMFREY ROOT, DOMESTIC		44
CONGO RED		109
CONTAMINANTS		112
CONTRACEPTIVE ESTROGENS AND PROGESTINS		61
CONTRACEPTIVE STEROIDS		61
CONVULSANTS		83
CONVULSANTS		91
COPPER		44
CORN OIL	8001-30-7	11
CORN OIL	8001-30-7	11
CORN OIL	8001-30-7	11
CORN OIL	8001-30-7	34
COTTON DUST		68
COUMAPHOS	56-72-4	40
COUMARIN	91-64-5	40
COUMARIN	91-64-5	34
CREOSOTE	8021-39-4	17
M-CRESIDINE	102-50-1	25
P-CRESIDINE	120-71-8	25
M-CRESOL	108-39-4	34

CHEMICAL	CAS NO.	PAGE
O-CRESOL	95-48-7	34
P-CRESOL	106-44-5	34
CRESOL (MIXED ISOMERS)	1319-77-3	34
CROCIDOLITE	12001-28-4	58
CROTONALDEHYDE	4170-30-3	34
CROTONALDEHYDE	4170-30-3	40
CRYOLITE	15096-52-3	109
P-CUMYL PHENYL GLYCIDYL ETHER	61578-04-9	17
CUPFERRON	135-20-6	25
CUPRIC SULFATE	7758-99-8	34
CYANIDE		66
CYANIDES		93
CYCLIC AMP	60-92-4	88
CYCLIC NITROSAMINES		12
CYCLOHEXAMINE	2201-15-2	66
CYCLOHEXANONE, OXIME	100-64-1	6
CYCLOPENTAPHENANTHRENE	203-64-5	17
CYCLOPHOSPHAMIDE	50-18-0	25
CYCLOPHOSPHAMIDE	50-18-0	81
CYCLOPHOSPHAMIDE	50-18-0	109
CYCLOPHOSPHAMIDE (TOXIC METABOLITES)	50-18-0	68
CYCLOSPORIN A	59865-13-3	17
CYCLOSPORIN A	59865-13-3	25
CYCLOSPORIN A	59865-13-3	109
CYCLOSPORINE		97
CYCLOSPORINE		97
CYCLOSPORINE		97
CYCLOVIR (ACV)	59277-89-3	97
CYPERMETHRIN	52315-07-8	109
CYTARABINE	147-94-4	17
CYTOCHALASIN	37187-49-8	88
CYTOCHALASIN	37187-49-8	88
DAPSONE		71
DAUNOMYCIN	20830-81-3	72
DAUNOMYCIN		72
DAUNOMYCIN	20830-81-3	72
DAUNOMYCIN	20830-81-3	109
DAUNORUBICIN	20830-81-3	56
DAUNORUBICIN	20830-81-3	56
D AND C ORANGE 5		44
D AND C RED 9	5160-02-1	44
D AND C YELLOW No. 11	8003-22-3	14
D AND C YELLOW NO. 11	8003-22-3	17
D AND C YELLOW NO. 11	8003-22-3	34
DDD	6088-51-3	17
DDE		109
DDT	50-29-3	109
DDT	50-29-3	88

0276

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
DEAZUPURINE ANALOGS		79
DEBRISOQUINE		62
DECANE	124-18-5	17
1-DECANOL	112-30-1	58
DECOYININE	2004-04-8	83
DEMECOLCINE	477-30-5	88
DEMECOLCINE	477-30-5	109
DEMETON	8065-48-3	88
4-(DEOXYADENOSIN-6-YL)4-AMINOBIPHENYL		48
4-(DEOXYADENOSIN-6-YL)-2-NAPHTHYLAMINE		48
2'-DEOXYCOFORMYCIN		109
DEOXYGLUCOSE		88
DEOXYGLUCOSE		88
3-(DEOXYGUANOSINE-N2-YL)-2-ACETYLAMINOFLUORENE		48
N-(DEOXYGUANOSINE-8-YL)-2-ACETYLAMINOFLUORENE		48
N-(DEOXYGUANOSINE-8-YL)-4-AMINOBIPHENYL		48
N-(DEOXYGUANOSINE-8-YL)-2-AMINOFLUORENE		49
N-(DEOXYGUANOSINE-8-YL)-1-AMINOPYRENE		49
DESIPRAMINE	56-47-5	63
1-DEUTERO-NAPHTHALENE		49
DEXAMETHASONE	50-02-2	49
DEXAMETHASONE	50-02-2	49
DEXAMETHASONE	50-02-2	49
DHPG		79
DHPG		79
DHPG		79
2,4-DIAMINOANISOLE SULFATE	39156-41-7	25
2,4-DIAMINODIPHENYLMETHANE	1208-52-2	17
2,4-DIAMINOPHENOL DIHYDROCHLORIDE	137-09-7	34
4,4'-DIAMINO-2,2'-STILBENEDIFULFONIC	81-11-8	40
4,4'-DIAMINO-2,2' STILBENEDISULFONIC ACID	81-11-8	25
4,4'-DIAMINO-2,2'-STILBENEDISULFONIC ACID	81-11-8	34
2,4-DIAMINOTOLUENE	95-80-7	30
DIARYLANILIDE YELLOW	6358-85-6	25
DIARYLANILIDE YELLOW	6358-85-6	40
DIAZACHOLESTEROL	313-05-3	88
20,25-DIAZACHOLESTEROL	313-05-3	88
DIAZEPAM	439-14-5	17
DIAZEPAM	439-14-5	88
DIAZEPAM	439-14-5	88
DIAZINON	333-41-5	109
DIAZO DYES		109
DIBENZO-P-DIOXIN	262-12-4	40
DIBROMOCHLOROPROPANE	96-12-8	74
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	12
DIBROMOETHANE	106-93-4	49
DIBROMOETHANE	106-93-4	109
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	18

CHEMICAL	CAS NO.	PAGE
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	30
DIBROMOMANNITOL	488-41-5	30
2,3-DIBROMO-1-PROPANOL	96-13-9	25
2,3-DIBROMO-1-PROPANOL	96-13-9	34
DIBUTYL ADENOSINE		109
DI-N-BUTYL ETHER	142-96-1	17
DIBUTYL PHTHALATE	84-74-2	34
DIBUTYL PHTHALATE	84-74-2	40
DIBUTYL PHTHALATE	84-74-2	109
DICHLORAN	99-30-9	30
DICHLORGACETIC ACID	79-43-6	109
DICHLOROACETONITRILE	3018-12-0	25
DICHLOROACETONITRILE	3018-12-0	109
2,4-DICHLOROANILINE	554-00-7	18
2,4-DICHLOROBENZALDEHYDE	874-42-0	18
2,6-DICHLOROBENZALDEHYDE	83-38-5	18
3,4-DICHLOROBENZALDEHYDE	6287-38-3	18
DICHLOROBENZENE	106-46-7	109
1,2-DICHLOROBENZENE	95-50-1	14
1,2 DICHLOROBENZENE	95-50-1	109
P-DICHLOROBENZENE	106-46-7	40
1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	95-50-1	30
DICHLOROBENZOIC ACID	35915-19-6	18
DICHLOROBENZOIC ACIDS		88
5,6-DICHLORO-2-BENZOTHIAZOLAMINE	24072-75-1	34
5,6-DICHLORO-2-BENZOTHIAZOLAMINE	24072-75-1	40
2,2'-DICHLOROBIPHENYL	13029-08-8	18
CIS-DICHLORODIAMINE PLATINUM	15663-29-1	18
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	25
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	30
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	83
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	102
2,7-DICHLORODIBENZO-P-DIOXIN	33857-26-0	25
1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN	118-52-5	40
DICHLORODIPHENYLETHYLENE	72-55-9	12
DICHLORODIPHENYLTRICHLOROETHANE	50-29-3	25
1,1-DICHLOROETHANE	75-34-3	18
1,2-DICHLOROETHANE	107-06-2	25
1,2-DICHLOROETHANE	107-06-2	34
1,2-DICHLOROETHANE	107-06-2	34
1,2 DICHLOROETHANE	107-06-2	110
1,1-DICHLOROETHANE	75-34-3	25
2,2-DICHLOROETHENYL DIMETHYL PHOSPHATE (9C1) [VAPONA]		110
CIS-1,2-DICHLOROETHYLENE	156-59-2	40
CIS-1,2 -DICHLOROETHYLENE	156-59-2	110
TRANS-1,2-DICHLOROETHYLENE	156-60-5	40
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	18
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	25

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	40
2,4-DICHLOROPHENOL	120-83-2	34
2,4-DICHLOROPHENOXYACETATE		88
2,4 DICHLOROPHENOXY ACETIC ACID	94-75-7	110
2,6-DICHLORO-P-PHENYLENEDIAMINE	609-20-1	30
2,6-DICHLORO-P-PHENYLENEDIAMINE	609-20-1	110
N-(3,5-DICHLOROPHENYL) SUCCINIMIDE		74
2,3-DICHLOROPROPANOL	616-23-9	110
2,3-DICHLOROPROPYLENE	78-88-6	25
ALPHA,ALPHA-DICHLOROTOLUENE	611-19-8	18
DICHLORVOS	62-73-7	35
N,N'-DICYCLOHEXYLTHIOUREA	1212-29-9	40
DIDEOXYADENOSINE		8
2',3'-DIDEOXYADENOSINE (NSC-98700)	4097-22-7	10
DIDEOXYCYTIDINE		6
DIDEOXYCYTIDINE		8
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
2',3'-DIDEOXYCYTIDINE (NSC-606170)	7481-89-2	10
1,3-DI((N-(4,6-DIMETHYL-2-PYRIMIDINYL)-4-SULFAMOYLPHENYL))		49
DIELDRIN	60-57-1	25
DIELDRIN	60-57-1	110
DIESEL EMISSION PARTICLES		110
DIETHANOLAMINE	111-42-2	35
DIETHANOLAMINE	111-42-2	35
DIETHANOLAMINE	111-42-2	35
DIETHYL [DIMETHOXYPHOSPHINYL) THIO]BUTANEDIOATE (9C1) [MALOXON]	1634-78-2	110
DIETHYLDICHLOROSILANE	1719-53-5	18
DIETHYLDITHIOCARBAMIC ACID	148-18-5	110
DIETHYLENE GLYCOL MONOBUTYL ETHER	112-34-5	18
DIETHYLHEXYLPHTHALATE	117-81-7	110
N,N-DIETHYL-4-((5-NITRO-2THIAZOLYL)AZO) BENZENAMINE	54289-46-2	18
DI(P-ETHYLPHENYL) DICHLOROETHANE	72-56-0	25
N,N-DIETHYL-P-PHENYLENEDIAMINE	93-05-0	25
DIETHYL PHTHALATE	84-66-2	12
DIETHYL PHTHALATE	84-66-2	14
DIETHYL PHTHALATE	84-66-2	35
DIETHYL PHTHALATE	84-66-2	40
DIETHYLSTILBESTROL	56-53-1	49
DIETHYLSTILBESTROL	56-53-1	59
DIETHYLSTILBESTROL	56-53-1	83
DIETHYLSTILBESTROL	56-53-1	110
DIETHYLTRIAZENE		2
DIFLUOROMETHYL ORNITHINE		110
DIGITALIS		66

CHEMICAL	CAS NO.	PAGE
DIGITALIS		66
DIGITALIS		66
DIGITONIN	11024-24-1	18
3,4-DIHYDROCOUMARIN	119-84-6	25
3,4-DIHYDROCOUMARIN	119-84-6	35
3,4-DIHYDROCOUMARIN	119-84-6	40
1,2-DIHYDRO-2,2,4-TRIMETHYLQUINOLINE	147-47-7	35
4,5-DIHYDROXY-1,3-BIS(HYDROXY METHYL)-2-IMIDAZOLIDINONE		14
1,8-DIHYDROXY-4,5-DINITROANTHRAQUINONE	81-55-0	30
4-(3',4'-DIHYDROXYPHENYL)PYRIDINE		75
DIHYDROXY PROPYL GUANOSINE		98
DIHYDROXYTRYPTAMINE	5090-36-8	110
5,6-DIHYDROXYTRYPTAMINE	5090-36-8	88
DIISOPROPYL FLUOROPHOSPHATE	55-91-4	110
DIMERCAPROL (BAL)	59-52-9	110
DIMERCAPTOSUCCINIC ACID	304-55-2	110
DIMETHOATE	60-51-5	40
DIMETHOXANE	828-00-2	35
DIMETHOXYBENZIDINE	119-90-4	49
3,3'-DIMETHOXYBENZIDINE	119-90-4	35
3,3'-DIMETHOXYBENZIDINE-4,4' DIISOCYANATE	91-93-0	25
4,4'-DIMETHOXYDIPHENYLAMINE	101-70-2	25
P-DIMETHYLAMINOAZOBENZENE	60-11-7	110
N,N-DIMETHYL-4-AMINOBENZENE		49
2-(DIMETHYLAMINOETHYLAMINO)PYRIDINE	23826-72-4	49
N,N-DIMETHYLANILINE	121-69-7	35
DIMETHYLBENZANTHRACENE	57-97-6	49
DIMETHYLBENZANTHRACENE	57-97-6	49
DIMETHYLBENZANTHRACENE	57-97-6	49
DIMETHYLBENZANTHRACENE	57-97-6	110
3,3'-DIMETHYLBENZIDINE	119-93-7	35
3,3'-DIMETHYLBENZIDINE	119-93-7	49
2,2-DIMETHYLBUTANE	75-83-2	18
2,3-DIMETHYLBUTANE	79-29-8	18
DIMETHYLDITALLOW AMMONIUM CHLORIDE	68783-78-8	18
DIMETHYLFORMAMIDE	68-12-2	30
DIMETHYLFORMAMIDE	68-12-2	49
2,5-DIMETHYLFURAN	625-86-5	18
DIMETHYL HYDROGEN PHOSPHITE	868-85-9	12
N-(2,2-DIMETHYL-HYDROXYETHYL)-4-METHYLBENZAMIDE		49
DIMETHYLNAPHTHALENE	28804-88-8	18
1,6-DIMETHYLNAPHTHALENE	575-43-9	18
1,3-DIMETHYL-2-NITROBENZENE	81-20-9	18
DIMETHYLNITROSAMINE	62-75-9	49
DIMETHYLNITROSAMINE	62-75-9	75
DIMETHYLNITROSAMINE	62-75-9	110
N,N-DIMETHYL-N-OCTADECYLBENZENEMETHANAMINIUM CHLORIDE	122-19-0	18

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
2,3-DIMETHYL-1-PENTANOL	10143-23-4	18
DIMETHYL PHENOL	1300-71-6	18
2,4 DIMETHYLPHENOL	105-67-9	110
DIMETHYL PHTHALATE	131-11-3	12
DIMETHYL PHTHALATE	131-11-3	14
DIMETHYL PHTHALATE	131-11-3	26
DIMETHYL PHTHALATE	131-11-3	35
DIMETHYL PHTHALATE	131-11-3	40
DIMETHYLSUBERIMIDATE		101
DIMETHYLSUCCINATE	106-65-0	18
DIMETHYL SULFOXIDE	67-68-5	18
DIMETHYL SULFOXIDE	67-68-5	26
N,N-DIMETHYLUREA	96-31-1	40
N,N'-DI-2-NAPTHYL-P-PHENYLENEDIAMINE	93-46-9	26
2,4-DINITROANILINE	97-02-9	18
2,4-DINITROANILINE	97-02-9	40
M-DINITROBENZENE		110
4,6 DINITRO-O-CRESOL		110
2,7-DINITRO-9H-FLUOREN-9-ONE	31551-45-8	26
1,5-DINITRONAPHTHALENE	605-71-0	18
DINITROPYRENE		49
1,3-DINITROPYRENE	75321-20-9	49
1,6-DINITROPYRENE	42397-64-8	49
1,8-DINITROPYRENE	42397-65-9	49
(3H)-1,3-DINITROPYRENE		49
(3H)-1,6-DINITROPYRENE		49
(3H)-1,8-DINITROPYRENE		49
DINITROPYRENE MIXTURE	EMTDP-35	18
2,4-DINITROTOLUENE	121-14-2	41
DINOCAP		110
DINOSEB	88-85-1	110
4,4'-DIOCTYLDIPHENYLAMINE	101-67-7	26
DI-N-OCTYLTIN DICHLORIDE		110
1,5,2,4-DIOXADITHIEPANE, 2,2,4,4-TETRAOXIDE		10
DIOXANE	123-91-1	44
DIOXATHION	78-34-2	41
DI-PENTYLPHTHALATE	131-18-0	12
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	26
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	35
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	41
DIPHENYL ETHERS		110
DIPHENYLHYDANTOIN	57-41-0	49
DIPHENYLHYDANTOIN	57-41-0	49
DIPHENYLHYDANTOIN	57-41-0	49
DIPHENYLHYDANTOIN	57-41-0	84
DIPHENYLHYDANTOIN	57-41-0	86
DIPHENYLHYDANTOIN	57-41-0	88
DIPHENYLHYDANTOIN	57-41-0	91

CHEMICAL	CAS NO.	PAGE
DIPHTHERIA TOXINS		88
DIPROPYLACETIC ACID	99-66-1	88
DIPROPYLAMINE	142-84-7	110
DIPROPYLENE GLYCOL	25265-71-8	8
DIPROPYLENE GYCOL	25265-71-8	6
DIPYRIDAMOLE	58-32-2	89
DIQUAT		110
1,3-DI(4-SULFAMOYLPHENYL)TRIAZINE		50
2,4-DITHIOBIURET	541-53-7	110
DIURETICS		85
DMBA	57-97-6	35
DMBA/TPA/BPO (7,12-DIETHYLBENZ(A)ANTH	57-97-6	35
DNP-LYSINE		89
DODECENYLSUCCINIC ANHYDRIDE	25377-73-5	6
TERT-DODECYL MERCAPTAN	25103-58-6	18
DOPA	59-92-7	89
DOPAMINE	51-61-6	81
DOPAMINE	51-61-6	84
DOPAMINE	51-61-6	87
DOPAMINE	51-61-6	89
DOPAMINE	51-61-6	89
DOPAMINE, NEUROTOXINS		92
DOXORUBICIN	23214-92-8	56
DOXORUBICIN	23214-92-8	56
DOXORUBICIN		72
DOXORUBICIN		72
DOXORUBICIN		72
DOXYLAMINE	469-21-6	50
DOXYLAMINE	469-21-6	50
DOXYLAMINE	469-21-6	50
DOXYLAMINE (14-C)	469-21-6	50
DOXYLAMINE SUCCINATE	562-10-7	26
DOXYLAMINE SUCCINATE	562-10-7	41
DRINKING WATER CONTAMINANTS		111
DSMA(DISODIUM METHANEARSENATE)		110
ECONAZOLE	27220-47-9	18
ELLAGIC ACID	476-66-4	26
ENDOSULFAN	115-29-7	26
ENDOSULFAN	115-29-7	111
ENDOTOXIN		98
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
ENFLUREANE	13838-16-9	75
ENKEPHALIN		94
ENVIRONMENTAL AGENTS		59
EPHEDRINE	299-42-3	56
EPHEDRINE SULFATE	134-72-5	26

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
EPICHLOROHYDRIN	106-89-8	31
EPICHLOROHYDRIN	106-89-8	75
EPICHLOROHYDRIN	106-89-8	111
EPINEPHRINE	51-43-4	18
EPINEPHRINE	51-43-4	26
EPINEPHRINE	51-43-4	90
EPINEPHRINE	51-43-4	41
EPINEPHRINE HYDROCHLORIDE	55-31-2	35
1,2-EPOXYBUTANE	106-88-7	41
2,3-EPOXYBUTANE	3266-23-7	19
2,3-EPOXY-2,3-DIMETHYLBUTANE	5076-20-0	19
1,2-EPOXYHEXADECANE	7320-37-8	35
1,2-EPOXY-1,1,2,3,3,3-HEXAFLUOROPROPANE	428-59-1	19
ERGOTAMINE TARTRATE	379-79-3	8
ERGOTAMINE TARTRATE	379-79-3	6
ERYTHROMYCIN STEARATE	643-22-1	35
ERYTHROMYCIN STEARATE	643-22-1	41
ERYTHROSIN B	16423-68-0	83
ESTRADIOL	50-28-2	50
ESTRADIOL	50-28-2	50
ESTRADIOL	50-28-2	50
ESTROGEN		111
ETHANOL		64
ETHANOL	64-17-5	66
ETHANOL	64-17-5	111
ETHIDIUM BROMIDE		111
ETHIONAMIDE	536-33-4	19
ETHIONAMIDE	536-33-4	26
ETHIONAMIDE	536-33-4	41
ETHIONINE	13073-35-3	75
ETHOXYLATED DODECYL ALCOHOL	9002-92-0	31
ETHYL ACETATE	141-78-6	26
ETHYL ACRYLATE	140-88-5	111
ETHYL ACRYLATE	140-88-5	111
ETHYL ALCOHOL	64-17-5	19
ETHYL ALCOHOL	64-17-5	31
ETHYL ALCOHOL	64-17-5	111
ETHYL BENZENE	100-41-4	111
ETHYL BROMIDE	74-96-4	35
ETHYL BROMIDE	74-96-4	41
2-ETHYLBUTYRIC ACID		111
ETHYL CHLORIDE	75-00-3	19
ETHYL CHLORIDE	75-00-3	26
ETHYL CHLORIDE	75-00-3	35
N-ETHYL-N,N-DIPHENYLUREA	18168-01-9	19
ETHYLENE DIBROMIDE	106-93-4	75
ETHYLENE DIISOTHIOCYANATE		111
ETHYLENE GLYCOL	107-21-1	35
ETHYLENE GLYCOL	107-21-1	50
ETHYLENE GLYCOL	107-21-1	111
ETHYLENE GLYCOL DIACRYLATE	2274-11-5	6
ETHYLENE GLYCOL DIACRYLATE	2274-11-5	8
ETHYLENE GLYCOL DIETHYL ETHER	629-14-1	14
ETHYLENE GLYCOL DIMETHACRYLATE	97-90-5	8
ETHYLENE GLYCOL DIMETHACRYLATE	97-90-5	6
ETHYLENE GLYCOL MONOETHYL ETHER	110-80-5	35
ETHYLENE OXIDE	75-21-8	19
ETHYLENE OXIDE	75-21-8	26
ETHYLENE OXIDE	75-21-8	31
ETHYLENE OXIDE	75-21-8	111
ETHYLENE THIOUREA	96-45-7	35
ETHYL ETHER	60-29-7	19
ETHYL ETHER	60-29-7	111
2-ETHYLHEXANOIC ACID	144-57-5	111
2-ETHYL HEXANOL	104-76-7	14
2-ETHYLHEXANOL	104-76-7	26
ETHYL METHACRYLATE	97-63-2	111
ETHYL METHANESULFONATE	62-50-0	111
N-ETHYL-4-NITROANILINE	3665-80-3	19
ETHYLNITROSOUREA	759-73-9	111
O-ETHYL PHENOL	90-00-6	19
ETHYLTHMIDYL(3'-5')DEOXYADENOSINE		50
ETHYLTHYMIDYL(3'-5')DEOXYCYTIDINE		50
TRANS FATTY ACIDS		44
FD AND C RED NO. 40	25956-17-6	44
FD AND C YELLOW NO. 5	1934-21-0	44
FD AND C YELLOW NO. 6	2783-94-0	31
FD & C YELLOW NO. 6	2783-94-0	26
FENFLURAMINE		62
FENTHION	55-38-9	111
FERRIC AMMONIUM FERROCYANIDE	25869-00-5	19
FERRIC AMMONIUM FERROCYANIDE	25869-00-5	26
FERROCENE	102-54-5	35
FLUBOPROFEN		98
FLUOMETURON	2164-17-2	26
9-FLUORENONE	486-25-9	6
9-FLUORENONE	486-25-9	8
8-(N-FLUOREN-2-YLACETAMIDO)-2'-DEOXYGUANOSINE 5'-MONO PHOSPHATE	14490-86-9	50
8-(N-FLUOREN-2-YLAMINO)-2'DEOXYGUANOSINE 5'-MONO PHOSPHATE	17660-46-7	50
FLUORESCEINS		83
6-FLUOROBENZO(A)PYRENE		75
5-FLUORO-2'-DEOXYCYTIDINE	10356-76-0	41
5-FLUORO-2-DEOXYURIDINE		111
P-FLUOROPHENYLALANINE		111

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
FLUOROPHOSPHONATE DERIVATIVES		79
5-FLUOROURACIL	51-28-8	50
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL	51-21-8	111
FLUOROURIDINE		98
FLURAZEPAM	17617-23-1	26
FLURAZEPAM	17617-23-1	19
7-FLUROBENZANTHRACENE-TRANS-5,6-DIHYDRODIOL		50
FMAU		79
FMAU		79
FOLATE		62
FOLPET		111
FORMALDEHYDE	50-00-0	75
FORMAMIDE	75-12-7	31
FORMANILIDE	103-70-8	19
FORMETANATE	23422-53-9	111
FORMIC ACID	64-18-6	19
FORMIC ACID	64-18-6	35
FORMIC ACID	64-18-6	41
FORMULATED FENAMINOSULF	140-56-7	41
N-FORMYL-N-HYDROXY-2-AMINOFLUORENE	67176-33-4	50
FOSCARNET		80
FOSCARNET		80
FOSCARNET		80
FOSCARNET		80
FUMARIC ACID DINITRILE	EMTDP-73	19
FUMARIC ACID DINITRILE	EMTDP-73	26
FUMARYLACETONE		6
FURAN	110-00-9	26
FURAN	110-00-9	35
FURFURAL	98-01-1	35
FUROSEMIDE	54-31-9	35
FUROSEMIDE	54-31-9	75
FUROSEMIDE		96
FUROSEMIDE	54-31-9	26
GALACTOSAMINE	7535-00-4	75
GALLIUM ARSENIDE	1303-00-0	12
GALLIUM ARSENIDE	1303-00-0	14
GALLIUM ARSENIDE	1303-00-0	19
GENTAMYCIN	1403-66-3	56
GENTAMICIN	1403-66-3	75
GENTAMICIN	1403-66-3	75
GENTAMICIN	1403-66-3	75
GENTAMYCIN	1403-66-3	85
GENTAMICIN	1403-66-3	98
GENTIAN VIOLET	548-62-9	50
GENTIAN VIOLET	548-62-9	50
GENTIAN VIOLET	548-62-9	50
GEPHYROTOXIN	55893-12-4	76
GEPHYROTOXIN	55893-12-4	89
GERANYL ACETATE	105-87-3	31
GILSONITE	12002-43-6	19
GLIOTOXINS		89
GLUCOCORTOIDS		86
GLUTAMATE		98
GLUTARALDEHYDE	111-30-8	35
GLUTARALDEHYDE	111-30-8	35
GLUTARALDEHYDE	111-30-8	101
GLUTARALDEHYDE	111-30-8	44
GLUTARIC ACID	110-94-1	41
GLYCIDOL	556-52-5	35
GLYCOL ETHER ACETATES		14
GLYCOL ETHERS		12
GLYCOL(POLYSORBATE 80)	9005-65-6	35
GLYPHOSATE	1071-83-6	14
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD SODIUM THIOMALATE	39377-38-3	56
GOLD SODIUM THIOMALATE	39377-38-3	81
GOLD SODIUM THIOMALATE	39377-38-3	81
GOLDTHIOMALATE	39377-38-3	56
GONADATROPIC RELEASING HORMONE ANALOGS		59
GONADOTROPIC RELEASING HORMONE (38 ANALOGS)		59
GONYAUTOXINS	35554-08-6	89
GRAYANOTOXIN	1399-60-6	89
GRAYANOTOXINS, SAXITOXIN		94
GRISEOFULVIN	126-07-8	89
GRISEOFULVIN	126-07-8	111
N-(GUANOSINE-8-YL)-4-AMINOBIPHENYL		50
GUAR GUM	9000-30-0	19
GUM ARABIC	9000-01-5	19
HADACIDIN	689-13-4	83
HALOACETONITRILES		111
HALO ALKYL PHOSPHATES		11
HALOAROMATIC COMPOUNDS		83
HALOBENZENES		89
HALOGENATED ACETONITRILES		111
HALOGENATED DIBENZOFURANS		12

0281

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
HALOGENATED ETHANES		112
HALOPERIDOL	52-86-8	95
HALOTHANE	151-67-7	72
HALOTHANE	151-67-7	76
HALOTHANE	151-67-7	89
HAZARDOUS AIR POLLUTANTS		112
HC BLUE 2	33229-34-4	31
HC-BLUE-NO. 1	2784-94-3	50
HC YELLOW 4	52551-67-4	35
HC YELLOW 4	52551-67-4	41
HC RED 3	2871-01-4	26
HEAT STABLE TOXIN OF E. COLI		44
HEAVY METALS		88
HEAVY METALS		89
HEAVY METALS		90
HEMATOPORPHYRIN		98
HEPTACHLOR	76-44-8	41
N-HEPTANAL	111-71-7	19
N-HEPTANOIC ACID	111-14-8	19
1,2,3,4,6,7-HEXABROMONAPHTHALENE	75625-24-0	19
HEXACHLOROBENZENE	118-74-1	26
HEXACHLOROBENZENE	118-74-1	112
1,2,3,4,7,7-HEXACHLOROBICYCLO(2.2.1)HMRP-2,5-DIENE	3389-71-7	19
HEXACHLOROBIPHENYL		112
HEXACHLORO-BUTADIENE	87-68-3	14
HEXACHLORO-1,3-BUTADIENE	87-68-3	41
HEXACHLORO-1,3-BUTADIENE	87-68-3	12
1,2,3,4,5,6-HEXACHLOROCYCLOHEXANE (3C1) [LINDANE]	58-89-9	112
HEXACHLOROCYCLOPENTADIENE	77-47-4	26
HEXACHLOROCYCLOPENTADIENE	77-47-4	35
HEXACHLOROCYCLOPENTADIENE	77-47-4	41
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	19
1,2,3,7,8,9-HEXACHLORODIBENZOP-DIOXIN	19408-74-3	19
HEXACHLOROETHANE	67-72-1	35
HEXACHLOROETHANE	67-72-1	41
HEXACHLOROPHENE	70-30-4	26
HEXACHLOROPHENE	70-30-4	89
1,1,1,3,3,3-HEXAFLUORO-2-PROPANOL	920-66-1	19
HEXAMETHYLENE DIAMINE - 2HCl		112
HEXAMETHYLPHOSPHORAMIDE	680-31-9	31
HEXANE	110-54-3	12
N-HEXANE	110-54-3	14
N-HEXANE	110-54-3	26
N-HEXANE	110-54-3	36
N-HEXANE	110-54-3	41
1,6-HEXANEDIAMINE, DIHYDROCHLORIDE	6055-52-3	26
1,6-HEXANEDIAMINE DIHYDROCHLORIDE	6055-52-3	36
1,6-HEXANEDIAMINE DIHYDROCHLORIDE	6055-52-3	36

CHEMICAL	CAS NO.	PAGE
HEXYLBENZOATE	6789-88-4	19
HEXYLRESORCINOL	136-77-6	36
HISTAMINE	51-45-6	89
HISTIDINOL		6
HISTRIONICOTOXIN	34685-67-1	76
HUMIC ACID	1415-93-6	112
HYCANTHONE METHANESULFONATE	23255-93-8	19
HYDANTOINS		91
HYDRALAZINE	86-54-4	56
HYDRALAZINE	86-54-4	56
HYDROCHLOROTHIAZIDE	58-93-5	36
HYDROCHLOROTHIAZIDE	58-93-5	4
HYDROCHLOROTHIAZIDE	58-93-5	4
HYDROGEN PEROXIDE	7722-84-1	98
HYDROGEN PEROXIDE	7722-84-1	98
HYDROGEN PEROXIDE		98
HYDROGEN PEROXIDE		92
HYDROGEN PEROXIDE	7722-84-1	98
HYDROQUINONE	123-31-9	31
HYDROQUINONE	123-31-9	36
N-HYDROXYACETAMINOPHEN	63975-21-3	50
4-HYDROXYACETANILIDE	103-90-2	36
N-HYDROXY-2-ACETYLAMINOFLUORENE	53-95-2	50
N-HYDROXY-2-ACETYLAMINOFLUORENE	53-95-2	50
N-HYDROXY-N-ACETYL-2-AMINOFLUORENE		51
N-HYDROXY-N-ACETYL-2-AMINOFLUORENE	30651-40-2	50
N-HYDROXY-1-ACETYLAMINOPYRENE		51
N'-HYDROXY-N-ACETYLBENZIDINE	71609-23-9	51
N-HYDROXY-N-ACETYLBENZIDINE	71609-25-1	51
N-HYDROXY-4-AMINOBIPHENYL	6810-26-0	51
N-HYDROXY-6-AMINOCHRYSENE		51
N-HYDROXY-AMINOFLUORENE	53-94-1	51
N-HYDROXY-AMINOFLUORENE	53-94-1	51
N-HYDROXY-2-AMINOFLUORENE	53-94-1	51
N-HYDROXY-1-AMINOPYRENE		51
2-HYDROXY-BUPROPION		63
HYDROXYCHLOROQUINE	118-42-3	82
6-HYDROXYDOPAMINE	1199-18-4	89
HYDROXYEICOSATETRAENOIC ACIDS (HETES)		98
N-HYDROXY-N-FORMYL-2-AMINOFLUORENE		51
2-(HYDROXYIMINO)-N-PHENYLACETAMIDE	1769-41-1	6
2-(HYDROXYIMINO)-N-PHENYLACETAMIDE	1769-41-1	8
HYDROXYLAMINE, HYDROCHLORIDE	5470-11-1	19
HYDROXYL RADICAL		99
HYDROXYL RADICAL		99
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	26
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	36
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	36

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	14
2-HYDROXY-1,4-NAPHTHOQUINONE	83-72-7	31
(3H)-N-HYDROXY-1-NAPHTHYLAMINE		51
(3H)N-HYDROXY-2-NAPHTHYLAMINE		51
N-HYDROXY-1-NAPHTHYLAMINE	607-30-7	51
N-HYDROXY-1-NAPHTHYLAMINE	607-30-7	51
N-HYDROXY-2-NAPHTHYLAMINE	613-47-8	51
N-HYDROXY-2-NAPHTHYLAMINE	613-47-8	51
N-HYDROXYPHENACETIN	19315-64-1	51
N-HYDROXY-P-PHENETIDINE	19315-64-1	51
N-HYDROXY-N-PROPIONYL-2AMINOFLUORENE		51
8-HYDROXYQUINOLINE	148-24-3	31
8-HYDROXYQUINOLINE SULFATE	134-31-6	31
IMINODIPROPIONITRILE	111-94-4	112
INDOMETHACIN	53-86-1	95
INORGANIC DRINKING WATER		112
BETA-INTERFERON		80
INTERFERON	9008-11-1	83
GAMMA-INTERFERON		80
INTERFERON	9008-11-1	99
INTERFERON		80
GAMMA-INTERFERON		80
IN VITRO NEUROTOXICITY		83
IODACETIC ACID	64-69-7	19
IODINATED GLYCEROL	5634-39-9	36
IODINATED GLYCEROL	5634-39-9	26
IODOFORM	75-47-8	41
4-IPOMEANOL		8
4-IPOMEANOL (NSC-349438)	32954-58-8	10
IPRONIAZID	54-92-2	76
IPROPLATIN		102
IRON	7439-89-6	76
IRON CHELATES		76
IRON CHLORIDE		112
ISOAMYL NITRITE	110-46-3	6
S-26308 (1-ISOBUTYL-1-H IMIDAZO[4,5-C] QUINOLIN-4-AMINE)		80
ISOBUTYL NITRITE	542-56-3	6
ISOBUTYL NITRITE	542-56-3	36
ISOBUTYRALDEHYDE	78-84-2	36
ISOINDOLO[1,2-B]QUINAZOLIN12-(10H)-ONE, 8-AMINO (NSC-SC-320846D)		10
ISOPENTANE	78-78-4	19
ISOPENTANE	78-78-4	31
ISOPENTANE	78-78-4	26
ISOPRENE	78-79-5	14
ISOPRENE	78-79-5	26
ISOPRENE	78-79-5	31

CHEMICAL	CAS NO.	PAGE
ISOPRENE	78-79-5	36
P-ISOPROPOXYDIPHENYLAMINE	101-73-5	26
ISOPROPYL ACETATE	108-21-4	19
N-ISOPROPYLANILINE	768-52-5	20
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TYPE I, TRIBUTYLAMINE AS STABILIZER)	107-44-8	51
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TYPE II, DIISOPROPLYCARBOIIMIDE AS STABILIZER	107-44-8	51
N-ISOPROPYL-N'-PHENYL-PPHENYLENEDIAMINE	101-72-4	27
ISOPROTERENOL	7683-59-2	56
ISOPROTERENOL	7683-59-2	99
ISOPROTERENOL	7683-59-2	56
ISOPROTERENOL	7683-59-2	84
ISOQUINOLINES AND RELATED NALOGS		80
KAEMPFEROL	520-18-3	8
KAEMPFEROL	520-18-3	6
KAINIC ACID	487-79-6	84
KAINIC ACID	487-79-6	84
KAINIC ACID	487-79-6	89
KAINIC ACID		89
KANAMYCIN	59-01-8	85
KANAMYCIN	59-01-8	99
KANAMYCIN		99
KANAMYCIN SULFATE	25389-94-0	112
KAOLIN	1332-58-7	69
KAOLIN	1332-58-7	69
KARATHANE		112
KARATHANE		112
LANTHANUM NITRATE HEXAHYDRATE	10277-43-7	20
LASALOCIDS	11054-70-9	89
LAURIC ACID DIETHANOLAMINE	120-40-1	36
LAURIC ACID DIETHANOLAMINE CONDENSATE	120-40-1	27
LAURIC ACID DIETHANOLAMINE CONDENSATE	120-40-1	41
LAURYL CHLORIDE	112-52-7	20
LEAD	7439-92-1	62
LEAD	7459-92-1	62
LEAD	7439-92-1	84
LEAD	7439-92-1	89
LEAD		112
LEAD	7439-92-1	112
LEAD DIMETHYLDITHIOCARBAMATE	19010-66-3	41
LEVODOPA	59-92-7	82
LEVONORGESTREL		60
LHRH ANALOGS		65
LHRH ANALOGUES		59
LHRH ANTAGONISTS		60
LIDOCAINE		99
LIDOCAINE	137-58-6	90

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
D-LIMONENE	5989-27-5	36
LINDANE	58-89-9	41
LINDANE	58-89-9	51
LINDANE	58-89-9	51
LINDANE	58-89-9	51
LINDANE	58-89-9	112
LIPID EPOXIDES		11
LIPID SOLUBLE DRUGS		89
LIPOPOLYSACCHARIDE (E. COLI ENDOTOXIN)		76
LIPOPROTEIN LIPOPHILIC CARCINOGENS POLYNUCLEAR AROMATIC HYDROCARBONS		66
LITHIUM		59
LITHIUM		103
LITHIUM	7439-93-2	103
LITHIUM CHLORIDE	7447-41-8	112
LOCAL ANESTHETICS		90
LOCUST BEAN GUM	9000-40-2	20
LOFEXIDINE		51
ISOINDOLO[1,2-B]QUINAZOLIN12-(10H)-ONE, 8-AMINO (NSC-SC-320846D)		10
MAGNESIUM	7439-95-4	90
MALAOXON	1634-78-2	31
MALATHION	121-75-5	41
MALEIC HYDRAZIDE	123-33-1	112
MALONALDEHYDE, SODIUM SALT	24382-04-5	36
MALONDIALDEHYDE		99
MALONIC ACID	141-92-2	41
MALTOL	118-71-8	27
MALTOL	118-71-8	31
MANGANESE	7439-96-5	44
MANGANESE	7439-96-5	84
MANGANESE CHLORIDE		112
MANGANESE SULFATE MONOHYDRATE	10034-96-5	41
MANGANESE SULFATE MONOHYDRATE	10034-96-5	36
MANNITOL	69-65-8	112
D-MANNITOL	69-65-8	31
MELPHALAN	148-82-3	20
MEMBRANE ATTACK COMPLEX		76
D, L-MENTHOL	15356-70-4	112
DL-MENTHOL	15356-70-4	20
DL-MENTHOL	15356-70-4	31
MEPIVACAINE		99
2-MERCAPTOBENZIMIDAZOLE	583-39-1	36
2-MERCAPTOBENZIMIDAZOLE	583-39-1	41
MERCAPTOBENZOTHIAZOLE	149-30-4	41
2-MERCAPTOBENZOTHIAZOLE	149-30-4	36
MERCAPTOMERIN		112
2-MERCAPTO-4-METHYL-5THIAZOLYL METHYL KETONE	7725-93-1	20

CHEMICAL	CAS NO.	PAGE
6-MERCAPTOPURINE	6112-76-1	56
6-MERCAPTOPURINE	6112-76-1	56
6-MERCAPTOPURINE MONOHYDRATE	6112-76-1	20
6-MERCAPTOPURINE MONOHYDRATE	6112-76-1	31
MERCURIC CHLORIDE	7487-94-7	12
MERCURIC CHLORIDE	7487-94-7	36
MERCURIC CHLORIDE	7487-94-7	56
MERCURIC CHLORIDE	7487-94-7	56
MERCURIC CHLORIDE	7487-94-7	76
MERCURIC CHLORIDE	7487-94-7	112
MERCURIC CHLORIDE	7487-94-7	112
METALS		90
METHAMPHETAMINE		72
METHANE	74-82-8	20
METHAPYRILENE		4
METHOTREXATE	59-05-2	82
METHOTREXATE	59-05-2	82
METHOTREXATE	59-05-2	102
METHOTREXATE	59-05-2	112
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-60-0	27
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-10-0	36
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-60-0	41
2-(P-METHOXYBENZYLAMINO)-PYRIDINE		52
3-((METHOXYCARBONYL)AMINO)PHENYL CARBAMATE	13684-63-4	20
METHOXYCHLOR		112
2-METHOXYETHANOL	109-86-4	20
2-METHOXYETHYL ACETATE	110-49-6	27
METHOXYFLURANE	76-38-0	20
5-METHOXYPSORALEN	484-20-8	44
8-METHOXYPSORALEN	298-81-7	20
8-METHOXYPSORALEN	298-81-7	27
8-METHOXYPSORALEN	298-81-7	36
8-METHOXYPSORALEN	298-81-7	41
8-METHOXYPSORALEN	298-81-7	44
8-METHOXYPSORALEN	298-81-7	44
8-METHOXYPSORALEN	298-81-7	99
CIS METHRIN	35764-59-1	112
DELTA METHRIN	52918-63-5	113
METHYL ACETATE	79-20-9	41
3-METHYLADENINE	5142-23-4	52
7-METHYLADENINE	935-69-3	52
N-METHYL-4-AMINOAZOBENZENE	621-90-9	52
METHYLBENZENE	108-88-3	113
METHYLBENZOATE	93-58-3	20
7-METHYLBENZO(A)PYRENE	63041-77-0	52
4-(6-METHYL-2-BENZOTHIAZOLYL)BENZENAMINE	92-36-4	36
4-(6-METHYL-2-BENZOTHIAZOLYL)-BENZENAMINE	92-36-4	41
ALPHA-METHYLBENZYL ALCOHOL	98-85-1	36

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
P-METHYL BENZYL ALCOHOL	589-18-4	20
METHYL BIPHENYL	28652-72-4	20
METHYL BROMIDE	74-83-9	20
METHYL BROMIDE	74-83-9	36
METHYL [1-[(BUTYLAMINO) CARBONYL]-1H-BENZIMIDAZOL 2-YL]CARBAMATE (9C1) [BENOMYL]		113
2-METHYLBUTYRIC		113
METHYL CAPROATE	106-70-7	41
METHYL CARBAMATE	598-55-0	41
METHYLCARBAMATE	598-55-0	113
METHYL CHLORIDE	74-87-3	20
3-METHYLCHOLANTHENE	56-49-5	113
METHYLCHOLANTHRENE	56-49-5	76
METHYLCYCLOPENTANE	96-37-7	20
METHYL DEMETON	8022-00-2	90
METHYLDOPA	555-30-6	36
METHYLDOPA	555-30-6	41
METHYLDOPA	555-30-6	56
METHYLDOPA	555-30-6	56
2,2'-METHYLENE-BIS (4-CHLOROPHENOL)	97-23-4	20
2,2'-METHYLENE BIS(PHENYLENEOXYMETHYLENE)BISOXIRANE	39817-09-9	20
METHYLENE-BIS-THIOCYANATE	6317-18-6	14
METHYLENE BIS(THIOCYANATE)	6317-18-6	20
METHYLENE CHLORIDE	75-09-2	113
METHYLENEDIANILINE	101-77-9	20
4,4'-METHYLENEDIANILINE DIHYDROCHLORIDE	13552-44-8	31
2-METHYL-2-ETHOXYPROPANE	637-92-3	20
METHYL ETHYL KETONE	78-93-3	58
METHYL ETHYL KETOXIME	96-29-7	20
METHYL ETHYL KETOXIME	96-29-7	27
METHYLEUGENOL	93-15-2	36
9-METHYL FLUORENE	2523-37-7	20
METHYL FORMATE	107-31-3	20
METHYL FORMATE	107-31-3	42
METHYL-P-FORMYL BENZOATE	1571-08-0	20
2-METHYL FURAN	534-22-5	20
METHYLGLUTARONITRILE	4553-62-2	20
2-METHYLGLYCIDYL ACRYLATE	19900-46-0	20
METHYL ISOBUTYL KETONE	108-10-1	20
METHYL ISOBUTYL KETONE	108-10-1	58
METHYL ISOCYANATE	624-83-9	6
METHYL ISOCYANATE	624-83-9	8
METHYL ISOCYANATE	624-83-9	13
METHYL MERCURIC CHLORIDE	115-09-3	52
METHYL MERCURIC CHLORIDE	115-09-3	113
METHYL MERCURY	22967-92-6	65
METHYL MERCURY	22967-92-6	89
METHYL MERCURY	22967-92-6	113

CHEMICAL	CAS NO.	PAGE
METHYL METHACRYLATE	80-62-6	113
METHYL METHACRYLATE	80-62-6	113
METHYL METHANESULFONATE	66-27-3	52
METHYL METHANESULFONATE	66-27-3	52
METHYL METHANESULFONATE	66-27-3	52
METHYL METHANESULFONATE	66-27-2	113
3-METHYL-6-METHOXY-2-AMINO-BENZOTHIAZOLIDINE	NOCAS0884	36
3-METHYL-6-METHOXY-2AMINO-BENZOTHIAZOLIUM CHLORIDE	NOCAS0884	21
2-METHYL-2-(METHYLTHIO)PROPIONALDOXIME	1646-75-9	6
2-METHYL-2-(METHYLTHIO)ROPIONALDOXIME	1646-75-9	8
METHYL NAPHTHALENE	1321-94-4	21
N-METHYL-N-NITROSOGUANIDINE	70-25-7	113
N-METHYL-N-NITROSOUREA	684-93-5	52
N-METHYLOLACRYLAMIDE	924-42-5	27
N-METHYLOLACRYLAMIDE	924-42-5	36
N-METHYLOLACRYLAMIDE	924-42-5	42
METHYL PARATHION	298-00-0	42
METHYL PENTACHLOROSTEARATE	26638-28-8	21
1-METHYL PHENANTHRENE	832-28-8	21
2-METHYL PHENANTHRENE	2531-84-2	21
METHYLPHENIDATE	113-45-1	62
METHYLPHENIDATE HC1	298-59-9	36
1-METHYL-4-PHENYL-1,2,3,6TETRAHYDROPYRIDINE(MPTP)		76
1-METHYL-4-PHENYL-1,2,3,6 TETRAHYDROPYRIDINE	28289-54-5	113
METHYLPREDNISOLONE	83-43-2	90
METHYL PREDNISOLONE	83-43-2	95
1-METHYL PYRENE	2381-21-7	21
2-METHYLPYRIDINE	109-06-8	113
6-METHYLQUINOLINE	91-62-3	27
7-METHYLQUINOLINE	612-60-2	27
8-METHYLQUINOLINE	611-32-5	27
METHYL STEARATE	112-61-8	42
ALPHA-METHYLSTYRENE	98-83-9	21
ALPHA-METHYLSTYRENE	98-83-9	27
METHYL SUCCINIC ACID	498-21-5	21
N-METHYLSULFAMETHAZINE		52
3-METHYLTHYMIDINE	958-74-7	52
METHYLTHYMIDYLYL(3'-5')THYMIDINE		52
METHYL-P-TOLUATE	99-75-2	21
METHYL TRIFLUOROMETHANESULFONATE	333-27-7	21
METHYL VALERATE	624-24-8	42
METHYL VINYL KETONE	78-94-4	21
METHYL XANTHINES		44
METRAZOLE	54-95-5	90
MEXACARBATE	315-18-4	21
MINOXIDIL	38304-91-5	56
MINOXIDIL		72
MIPAFOX	371-86-8	113

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
MIREX	2385-85-5	36
MITOMYCIN-C		113
MOLYBDENUM TRIOXIDE	1313-27-5	36
MOLYBDENUM TRIOXIDE	1313-27-5	42
MONENSIN		72
MONOCHLOROACETIC ACID	79-11-8	36
MONOCHLOROACETIC ACID	79-11-8	113
MONOCROTALINE		69
MONOCROTALINE		69
MONO(2-ETHYLHEXYL)ADIPATE	4337-65-9	41
MONO-ETHYL-HEXYL PHTHALATE	4376-20-9	14
MONO(2-ETHYLHEXYL)PHTHALATE	4376-20-9	42
MONOGLUTAMIC FOLATE		61
MONOSODIUM GLUTAMATE	142-47-2	21
MONOSODIUM GLUTAMATE	142-47-2	113
MONURON	150-68-5	113
MONURON	150-68-5	42
MORPHINE	57-27-2	90
MORPHOLINE	110-91-0	113
1-MPTP		72
MPTP (1-METHYL-4-PHENYL1,2,3,6-TETRAHYDROPYRIDINE)		103
MPTP N-OXIDE		76
MSMA (MONOSODIUM METHANEARSENATE)	2163-80-6	113
MUTAGENIC AGENTS		76
MYCOTOXINS		88
MYCOTOXINS		88
MYCOTOXINS		11
MYLERAN	55-98-1	31
MYLERAN		113
NALIDIXIC ACID	389-08-2	36
NALOXONE	465-65-6	90
NAPHTHALENE	91-20-3	27
NAPHTHALENE	91-20-3	36
1-NAPHTHALENYL METHYLCARBAMATE (9C1) [SEVIN]		113
B-NAPHTHOFLAVONE		113
1-NAPHTHYLAMINE	134-32-7	27
1-NAPHTHYLAMINE	134-32-7	52
2-NAPHTHYLAMINE	91-59-8	52
(3H)1-NAPHTHYLAMINE		52
(3H)2-NAPHTHYLAMINE		52
BETA-NAPHTHYLAMINE	91-59-8	114
N-(1-NAPHTHYL)ETHYLENEDIAMINE DIHYDROCHLORIDE	1465-25-4	42
1,2-NAPTHALENEDIHYDRODIOL	7234-04-0	52
NEOMYCIN	1404-04-2	85
NEPHROTOXINS		76
NEPHROTOXINS		76
NETILMICIN	56311-56-1	77
NETILMICIN		99

CHEMICAL	CAS NO.	PAGE
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROPHARMACOLOGICAL AGENTS		84
NEUROPHARMACOLOGICAL AGENTS		84
NEUROPHARMACOLOGICAL AGENTS,		87
NEUROPHARMACOLOGICAL AGENTS		88
NEUROPHARMACOLOGICAL AGENTS		90
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		91
NEUROPHARMACOLOGICAL AGENTS		92
NEUROPHARMACOLOGICAL AGENTS		92
NEUROPHARMACOLOGICAL AGENTS		92
NEUROPHARMACOLOGICAL AGENTS		92
NEUROPHARMACOLOGICAL AGENTS		92
NEUROPHARMACOLOGICAL AGENTS		93
NEUROPHARMACOLOGICAL AGENTS,		94
NEUROPHARMACOLOGICAL AGENTS		94
NEUROPHARMACOLOGICAL AGENTS		95
NEUROPHARMACOLOGICAL AGENTS		96
NEUROPHARMACOLOGICAL AGENTS (ANTICONVULSANTS)		87
NEUROPHARMACOLOGY		92
NEUROPHARMACOLOGY		92
NEUROPHARMACOLOGY		92
NEUROPHARMACOLOGY		94
NEUROTOXINS		77
NEUROTOXINS		84
NEUROTOXINS		84
NEUROTOXINS		85
NEUROTOXINS		85
NEUROTOXINS		87
NEUROTOXINS		88
NEUROTOXINS		89
NEUROTOXINS		89
NEUROTOXINS		90
NEUROTOXINS		90

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
NEUROTOXINS		91
NEUROTOXINS		91
NEUROTOXINS		91
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NEUROTOXINS		94
NICKEL	7440-02-0	114
NICKEL CARBONATE		114
NICKEL CHLORIDE		114
NICKEL CHLORIDE		114
NICKEL DUST		114
NICKEL HYDROXIDE		114
NICKEL OXIDE	1313-99-1	37
NICKEL SUBSULFIDE	12035-77-3	37
NICKEL SUBSULFIDE	12035-72-2	21
NICKEL SULFATE		13
NICKEL SULFATE		114
NICKEL SULFATE HEXAHYDRATE	10101-97-0	37
NICOTINE		94
NICOTINE	54-11-5	114
NICOTINE	54-11-5	63
NIFEDIPINE	21829-25-4	21
NITHIAZIDE	139-94-6	27
NITRILES		66
NITRITE	14797-65-0	4

CHEMICAL	CAS NO.	PAGE
P-NITROANILINE	100-01-6	37
O-NITROANISOLE	91-23-6	14
O-NITROANISOLE	91-23-6	37
9-NITROANTHRACENE	602-60-8	27
4-NITROANTHRANILIC ACID	619-17-0	42
4-NITRO-1,3-BENZENEDIAMINE	5131-58-8	27
O-NITROBENZOIC ACID	552-16-9	27
M-NITROBENZOIC ACID	121-92-6	37
O-NITROBENZOIC ACID	552-16-9	21
P-NITROBENZOIC ACID	62-23-7	37
6-NITROBENZO(A)PYRENE	63041-90-7	52
6-NITROBENZO(A)PYRENE	63041-90-7	52
6-NITROBENZO(A)PYRENE	63041-90-7	52
P-NITROBENZOYL CHLORIDE	122-04-3	27
(3H)4-NITROBIPHENYL		52
4-NITROBIPHENYL	92-93-3	52
6-NITROCHRYSENE	7496-02-8	52
2-NITROETHANOL	625-48-9	21
NITROFEN	1836-75-5	114
NITROFEN ANALOGS		114
3-NITROFLUORANTHENE		114
2-NITROFLUORENE	607-57-8	52
2-NITROFLUORENE	607-57-8	114
NITROFURANTOIN	67-20-9	27
NITROFURANTOIN	67-20-9	37
NITROFURANTOIN	67-20-9	56
NITROFURANTOIN	67-20-9	56
NITROFURANTOIN	67-20-9	69
NITROFURANTOIN	67-20-9	69
NITROFURANTOIN	67-20-9	69
NITROFURAZONE	59-87-0	37
NITROGEN DIOXIDE		69
NITROGEN DIOXIDE	10102-44-0	114
NITROGEN DIOXIDE	10102-44-0	114
NITROGEN DIOXIDE	10102-44-0	114
NITROGLYCERIN	55-63-0	94
NITROMETHANE	75-52-5	37
2-NITRO-2-METHYLANTHRAQUINONE	129-15-7	114
1-NITRONAPHTHALENE	86-57-7	52
O-NITROPHENOL	88-75-5	31
M-NITROPHENOL	554-84-7	31
P-NITROPHENOL	100-02-7	37
P-NITROPHENOL	100-02-7	42
P-NITROPHENOL	100-02-7	52
2-NITRO-P-PHENYLENEDIAMINE	5307-14-2	21
4-NITRO-O-PHENYLENEDIAMINE	99-56-9	31
5-(4-NITROPHENYL)PENTA2,4-DIENAL		8
5-(4-NITROPHENYL)PENTA2,4-DIENAL		6

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
4-NITROPHENYLHYDROXYLAMINE	16169-16-7	52
4-NITROPHTHALIC ANHYDRIDE	5466-84-2	21
3-NITROPROPIONIC ACID	504-88-1	114
NITROPRUSSIDE	15078-28-1	66
NITROPRUSSIDE	13755-38-9	66
1-NITROPYRENE	5522-43-0	21
1-NITROPYRENE	5522-43-0	52
1-NITROPYRENE	5522-43-0	52
1-NITROPYRENE	5522-43-0	114
1-NITROPYRENE-CIS-4,5DIHYDRODIOL		52
1-NITROPYRENE-TRANS-4,5DIHYDRODIOL		53
(3H)-1-NITROPYRENE		52
1,NITROPYRENE-TRANS-4,5DIHYDRODIOL		53
10-NITROPYRENOL		53
3-NITROPYRENOL		53
4-NITROPYRENOL		53
5-NITROPYRENOL		53
6-NITROPYRENOL		53
8-NITROPYRENOL		53
9-NITROPYRENOL		53
4-NITROQUINONE		114
NITROSAMINE IN PACIFIERS: COMPLIANCE TESTING		53
NITROSAMINES IN PACIFIERS: COLLABORATION OF NCTR		53
4'-NITROSO-N-ACETYL-4-AMINOBIPHENYL		53
NITROSO-ALLYLUREA		2
NITROSO-N-AMYLUREA		2
4-NITROSOBIPHENYL	10125-76-5	53
NITROSOBIS-(2-HYDROXYPROPYL)-A-MINE		2
NITROSO-BIS-(2-OXOPROPYL)-AMINE		2
NITROSO-BIS-(2-OXOPROPYL)-AMINE	60599-38-4	2
NITROSO-BIS-(2-OXOPROPYL)AMINE-D4		2
NITROSO-N-BUTYLUREA		2
1-NITROSO-1-(2-CHLOROETHYL)-3-(2-HYDROXYPROPYL)-UREA		2
NITROSODIETHANOLAMINE		2
NITROSODIETHANOLAMINE	1116-54-7	2
N-NITROSODIETHANOLAMINE	1116-54-7	42
NITROSODIETHYLAMINE		2
NITROSO-DIETHYLUREA		2
NITROSO-DIETHYLUREA		9
NITROSODIMETHYLAMINE	62-75-9	2
NITROSODIMETHYLAMINE	62-75-9	2
NITROSO-DIMETHYLUREA		2
NITROSO-DIMETHYLUREA		9
N-NITROSODIPHENYLAMINE	86-30-6	27
P-NITROSODIPHENYLAMINE	156-10-5	27
1-NITROSO-1-ETHYL-3-(2-HYDROXYETHYL-UREA)		2
1-NITROSO-1-ETHYL-3-METHYLUREA		2
NITROSO-1-ETHYL-3-(2-OXOPROPYL)UREA		2

CHEMICAL	CAS NO.	PAGE
NITROSOETHYLUREA		2
N-NITROSO-N-ETHYLURETHANE	614-95-9	21
NITROSO-2-FLUOROETHYLUREA		2
NITROSO-N-HEXYLUREA		2
1-NITROSO-1-(2-HYDROXYETHYL)-3(2-CHLOROETHYL)UREA		2
1-NITROSO-1-(2-HYDROXYETHYL)3-ETHYLUREA		2
NITROSOHYDROXYETHYLUREA	13743-07-2	2
NITROSOHYDROXYETHYLUREA	13743-07-2	9
NITROSO-2-HYDROXY-MORPHOLINE		2
1-NITROSO-1-(2-HYDROXYPROPYL)-3(2-CHLOROETHYL)UREA		3
NITROSOHYDROXYPROPYLOXOPROPYLAMINE	61499-28-3	3
NITROSO-(2-HYDROXYPROPYL) (2-OXOPROPYL)AMINE		3
NITROSO-3-HYDROXYPROPYLUREA		3
NITROSO-2-METHOXETHYLUREA		3
NITROSOMETHYL-N-AMYLAMINE		9
NITROSO-N-METHYLANILINE	614-00-6	3
NITROSOMETHYL-N-BUTYLAMINE		9
NITROSOMETHYL-3-CARBOXYPROPYLAMINE		3
NITROSOMETHYL-CYCLOHEXYLAMINE		9
NITROSOMETHYLCYCLOHEXYLAMINE	5432-28-0	3
N-NITROSO-N-METHYLDODECYLAMINE	75356-79-5	44
NITROSOMETHYLETHYLAMINE	10595-95-6	3
1-NITROSO-1-METHYL-3-ETHYLUREA		3
NITROSOMETHYL-N-HEPTYLAMINE		9
NITROSOMETHYL-N-HEXYLAMINE	28538-70-7	9
NITROSOMETHYL-2-HYDROXYPROPYLAMINE		3
N-NITROSO-N-METHYLOCTADECYLAMINE		45
NITROSOMETHYL-N-OCTYLAMINE	34423-54-6	3
NITROSOMETHYL-N-OCTYLAMINE		9
NITROSOMETHYL-2-OXOPROPYLAMINE		3
NITROSOMETHYL-N-PROPYLAMINE		9
NITROSOMETHYLUREA		9
NITROSOMETHYLUREA	684-93-5	3
NITROSOMORPHOLINE		3
1-NITROSONAPHTHALENE	21711-65-9	53
NITROSO-1-(2-OXOPROPYL)-3ETHYLUREA		9
NITROSO-1-(2-OXOPROPYL)3-ETHYLUREA		3
NITROSO-2-OXOPROPYLUREA		9
NITROSO-2-OXOPROPYLUREA		3
P-NITROSOPHENETOLE	3420-97-1	53
4-NITROSOPHENOL	104-91-6	21
NITROSO-2-PHENYLETHYLUREA		9
NITROSO-2-PHENYLETHYLUREA		3
1-NITROSOPYRENE		53
NITROSOTHIALDINE		3
NITROSOTHIAZOLIDINE		3
BETA-NITROSTYRENE	102-96-5	21
BETA-NITROSTYRENE	102-96-5	27

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
P-NITROTOLUENE	99-99-0	37
P-NITROTOLUENE	99-99-0	42
NITROTOLUENES		14
NITROUS OXIDE	10024-97-2	53
NONANE	111-84-2	21
1-NONANOL	143-08-8	58
NOREPINEPHRINE	51-41-2	87
NOREPINEPHRINE	51-41-2	94
NTA(NITRILOTRIACETIC ACID)	139-13-9	31
OCHRATOXIN A	303-47-9	27
OCHRATOXIN A	303-47-9	37
OCHRATOXIN A	303-47-9	77
1-OCTANOL	111-87-5	58
OIL SHALE PRODUCTS		105
OLEIC ACID DIETHANOLAMINE	13961-86-9	27
OLEIC ACID DIETHANOLAMINE	13961-86-9	42
OLEIC ACID DIETHANOLAMINE SALT	13961-86-9	37
OLIGOMYCIN	1404-19-9	95
OLIVETOL	500-66-3	21
ONCOVIN	2068-78-2	114
OPIATES		94
ORAL CONTRACEPTIVES		61
ORAL CONTRACEPTIVES		61
ORAL CONTRACEPTIVES		61
ORGANIC CHLORAMINES		114
OUABAIN	630-60-4	66
OXALIC ACID	144-62-7	42
OXAMIDE	471-46-5	53
1,2-OXATHIOLATE-2,-2-DIOXIDE	1120-71-4	114
OXAZEPAM	604-75-1	21
OXAZEPAM	604-75-1	27
1,1-OXYBIS METHYLENE, BIS BENZENE	103-50-4	21
4,4'-OXYDIANILINE	101-80-4	31
OXYFLUORFEN		114
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN (SINGLET)		99
OXYTETRACYCLINE HYDROCHLORIDE	2058-46-0	42
OZONE	10028-15-6	69
OZONE	10028-15-6	69
OZONE	10028-15-6	115

CHEMICAL	CAS NO.	PAGE
OZONE	10028-15-6	115
OZONE	10028-15-6	115
OZONE	10028-15-6	115
PALYTOXIN	11077-03-5	95
PARACHLOROPHENYLALANINE	1991-78-2	95
PARAOXON	311-45-5	53
PARAOXON	311-45-5	53
PARAQUAT	4685-14-7	69
PARAQUAT		72
PARATHION	56-38-2	115
PARTICULATES		115
PBB'S		45
PCB		115
PCB'S		13
PENAMS		95
PENICILLAMINE	52-67-5	82
D-PENICILLAMINE	52-67-5	57
PENICILLAMINE HYDROCHLORIDE	2219-30-9	53
PENICILLIN V POTASSIUM	132-98-9	37
PENTACHLOROANISOLE	1825-21-4	37
PENTACHLOROBENZENE	608-93-5	37
PENTACHLOROPHENOL, DOWICIDE EC-7	87-86-5	37
PENTACHLOROPHENOL DOWICIDE EC-7	87-86-5	42
PENTACHLOROPHENOL, TECHNICAL	87-86-5	37
2,4,A,A,A-PENTACHLOROTOLUENE	13014-18-1	21
A,A,A,3,4-PENTACHLOROTOLUENE	13014-24-9	21
PENTAERYTHRITOL TETRANITRATE	78-11-5	27
PENTAERYTHRITOL TETRANITRATE	78-11-5	37
PENTAETHYLENEHEXAMINE	4067-16-7	31
PENTAMETHYLPARAROSANILINE	603-47-4	54
PENTAMETHYLPARAROSANILINE	603-47-4	54
N-PENTANAL	110-62-3	21
N-PENTANE	109-66-0	21
2-PENTANONE	107-87-9	21
2-PENTENENITRILE	13284-42-9	21
3-PENTENENITRILE	4635-87-4	21
PENTOBARBITAL		57
PENTYLENETETRAZOLE	54-95-5	95
PERCHLORETHYLENE	127-18-4	115
PERCHLOROMETHYL MERCAPTAN	594-42-3	21
PERHYDROHISTRIONICOTOXIN	40709-29-3	77
PERHYDROHISTRIONICOTOXIN	40709-29-3	95
PERMETHRIN	52645-53-1	115
PERMETHRIN	52645-53-1	115
PEROXIDES		69
PERTUSSIS TOXIN		72
PESTICIDES		115
PESTICIDES		115

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
PHALLOIDIN(E)	17466-45-4	77
PHENACETIN	62-44-2	42
PHENACETIN-D2		54
PHENANTHRENEIMINES		13
PHENESTERIN	3546-10-9	27
M-PHENETIDINE	621-33-0	21
PHENFORMIN HYDROCHLORIDE	834-28-6	42
PHENOBARBITAL	50-06-6	54
PHENOBARBITAL	50-06-6	57
PHENOBARBITAL	50-06-6	77
PHENOBARBITAL	50-06-6	84
PHENOBARBITAL	50-06-6	84
PHENOBARBITAL	50-06-6	91
PHENOBARBITAL	50-06-6	95
PHENOBARBITOL	50-06-6	115
PHENOLPHTHALEIN	77-09-8	37
PHENOXYBENZAMINE	59-96-1	95
PHENYLACETATE		62
PHENYLALKYLAMINES,		92
PHENYLALKYLAMINES		83
PHENYLALKYL AMINES		67
PHENYLALKYLAMINES, CATECHOLAMINES,		92
PHENYLAMIDES		90
PHENYLAMINES		71
PHENYLBUTAZONE	50-33-9	37
PHENYLCARBOXYLATES		95
PHENYLENEDIAMINE		115
M-PHENYLENEDIAMINE	108-45-2	27
O-PHENYLENEDIAMINE	95-54-5	27
P-PHENYLENEDIAMINE DIHYDROCHLORIDE	624-18-0	31
PHENYLEPHRINE		99
PHENYLHYDRAZINES		77
PHENYLMETHANE-SULFONYLFLUORIDE		115
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	37
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	42
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	14
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	27
N-PHENYL-P-PHENYLENEDIAMINE	101-54-2	42
PHENYLPHOSPHINE	638-21-1	22
PHENYLPROPANOLAMINE	14838-15-4	57
PHENYLPROPANOLAMINE	14838-15-4	57
1-PHENYL-2-THIOUREA	103-85-5	42
PHENYTOIN	57-41-0	37
PHENYTOIN	57-41-0	57
PHENYTOIN	57-41-0	57
PHENYTOIN	57-41-0	95
PHENYTOIN (DIPHENYLHYDANTOIN)	57-41-0	42
PHORBOL		115

CHEMICAL	CAS NO.	PAGE
PHORBOL ESTERS		82
PHORBOL-12-MYISTATE-13-ACETATE		115
PHOSGENE	75-44-5	115
PHOSPHATE ESTER MIXTURE:NC220	EMTOP-45	22
PHOSPHENE		115
3'-PHOSPHOADENOSINE-5'-PHOSPHOSULFATE		54
PHOSPHOPROTEIN PHOSPHATASES		95
PHOSPHORAMIDE		69
PHTHALAMIDE	88-96-0	115
PHTHALIC ACID	88-99-3	22
PHTHALIC ANHYDRIDE	85-44-9	42
PHTHALIC ANHYDRIDE	85-44-9	115
PHYLLANTHOSIDE		8
PHYLLANTHROSIDE	63166-73-4	10
PICLORAM	1918-02-1	115
PICRIC ACID	88-89-1	27
PICROTOXIN	124-87-8	95
PIMOZIDE	2062-78-4	95
PINACOLYL METHYLPHOSPHONOFLUORIDATE (SOMAN)		54
ANTI-PLATELET DRUGS		95
CIS-PLATINUM	15663-27-1	77
CIS-PLATINUM	15663-27-1	77
PLATINUM, TETRACHLORO (1,2,CYCLO-HEXANEDIAMINE-N,N')-, [OC-6-22-(TRANS)]-(NSC-363812)		10
PODOPHYLLOTOXIN	518-28-5	8
PODOPHYLLOTOXIN	518-28-5	6
POLYAMINES		69
POLYBROMINATED BIPHENYL (FF-I)	36355-01-8	37
POLYCHLORINATED BIPHENYLS		14
POLYCHLORINATED BIPHENYLS		14
POLYCHLORINATED BIPHENYLS		15
POLYCHLORINATED BIPHENYLS		15
POLYCHLORINATED DIBENZODIOXINS		115
POLYCYCLIC HYDROCARBONS		77
POLYDIMETHYLSILOXANE		54
POLYETHYLENE AS	9002-88-4	22
POLYSORBATE 80 (GLYCOL)	9005-65-6	27
POLYSORBATE 80 (GLYCOL)	9005-65-6	42
POLYSTYRENE	9003-53-6	22
POLYTHIAZIDE	346-18-9	22
POTASSIUM DICHROMATE	7778-50-9	22
POTASSIUM FLUORIDE	7789-23-3	42
POTASSIUM SUPEROXIDE		116
PRACTOLOL	6673-35-4	57
PRIMACLONE	125-33-7	6
PRIMACLONE	125-33-7	8
PRIORITY AIR POLLUTANTS		116
PRIORITY AIR POLLUTANTS		116

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
PROBENECID	57-66-9	27
PROBENECID	57-66-9	37
PROBENECID	57-66-9	42
PROBENECID	57-66-9	84
PROCAINAMIDE	51-06-9	57
PROCAINAMIDE	51-06-9	57
PROCAINAMIDE	51-06-9	82
PROCAINE HYDROCHLORIDE		90
PROCARBAZINE		116
PROCARBAZINE HYDROCHLORIDE	366-70-1	116
PROCTOLIN	57966-42-4	95
PROFLAVINE		116
PROGESTERONE	57-83-0	54
PROMETHAZINE HYDROCHLORIDE	58-33-3	37
PROMETHAZINE HYDROCHLORIDE	58-33-3	42
PROPANIL	709-98-8	54
PROPANOLOL	525-66-6	99
PROPARGYL ALCOHOL		116
BETA-PROPIOLACTONE	57-57-8	116
PROPIONIC ACID	79-09-4	22
PROPIONIC ACID	79-09-4	42
PROPIONIC ACID, METHYL ESTER	554-12-1	42
PROPIONITRILE	107-12-0	27
N-PROPIONYL-N-HYDROXY-2-AMINOFLUORENE	52663-84-0	54
PROPRANOLOL		57
PROPRANOLOL	525-66-6	57
PROPYLENE	115-07-1	22
PROPYLENE	115-07-1	27
PROPYLENE	115-07-1	31
PROPYLENE	115-07-1	42
PROPYLENE OXIDE	75-56-9	27
PROPYLENE OXIDE	75-56-9	42
1,2-PROPYLENE OXIDE	75-56-9	31
1,3-PROPYLENE OXIDE	503-30-0	28
PROPYL GALLATE	121-79-9	31
N-PROPYL NITRITE	543-67-9	6
PROSTAGLANDIN E1	745-65-3	95
PROSTAGLANDINS		95
PSORALEN	66-97-7	45
PSORALEN	66-97-7	82
PSORALENS		99
PSYCHOTROPICS		103
PUMILIOTOXIN		77
PYRAZINE DIAZOHYDROXIDE (NSC-361456)		10
PYRETHROIDS (VARIOUS)		116
PYRIDINE	110-86-1	37
PYRIDINE	110-86-1	116
PYRIDINES		94
PYRIDINES		94
PYRILAMINE	91-84-9	28
PYRILAMINE	91-84-9	54
PYRILAMINE	91-84-9	54
PYRILAMINE	91-84-9	54
PYRILAMINE	91-84-9	54
PYRILAMINE	91-84-9	54
PYRILAMINE MALEATE	91-84-9	54
PYRILAMINE MALEATE	59-33-6	42
PYRIMIDINE	289-95-2	84
PYRIMIDINES		87
PYRIMIDINES		92
QUERCETIN	117-39-5	22
QUERCETIN	117-39-5	28
QUERCETIN	117-39-5	37
QUERCETIN	117-39-5	42
QUINACRINE MUSTARD DIHYDROCHLORIDE		116
QUINAZOLINONES		95
QUINEBIDIMYL BENZILATE		95
QUINETHAZONE (AQUAMOX)	73-49-4	22
QUINIDINE	56-54-2	84
QUININE, QUINIDINE	56-54-2	71
QUINOLINES		11
QUINOLINES		11
QUINOLINES		93
QUINOLINES		94
QUINOLINE SULFATE	530-66-5	31
RADIOGRAPHIC CONTRAST MATERIAL		67
RADON	10043-92-2	116
RAUWOLFIA ALKALOIDS		95
RESERPINE	50-55-5	54
RESERPINE	50-55-5	96
RESERPINE	50-55-5	96
RESERPINE	50-55-5	116
RESORCINOL	108-46-3	13
RESORCINOL	108-46-3	37
RESPIRATORY SYSTEM TOXINS		70
RETINOIC ACID	302-79-4	54
RETINOIC ACID	302-79-4	116
TRANS-RETINOIC ACID	302-79-4	82
RETINOIC ACID AND ANALOGS		64
RETINOIDS		64
RHIZOXIN (NSC-332598)		10
RHODAMINE 6G	989-38-3	28
RHODAMINE 6G	989-38-8	37
RIBAVIRIN		80
RIBAVIRIN		80
RICIN	9009-86-3	77

0291

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
RIDDELLINE	23246-96-0	37
RIMANTIDINE		80
RIMANTIDINE		80
RITODRINE		63
RITODRINE		63
ROXARSONE	121-19-7	28
ROXARSONE	121-19-7	31
ROXARSONE	121-19-7	37
SACCHARIN	81-07-2	45
SACCHARIN	81-07-2	54
SACCHARIN	81-07-2	54
SACCHARIN	81-07-2	54
SACCHARIN, SODIUM SALT		116
SAFFLOWER OIL	8001-23-8	37
SALICYLATES		57
SALICYLATES		95
SALICYLAZOSULFAPYRIDINE	599-79-1	28
SALICYLAZOSULFAPYRIDINE	599-79-1	37
SALICYLAZOSULFAPYRIDINE (SULFASALAZINE)	599-79-1	82
SAXITOXIN	35523-89-8	91
SAXITOXIN	35523-89-8	93
SAXITOXIN	35523-89-8	96
SAXITOXIN	35523-89-8	96
SCOPOLAMINE	51-34-3	96
SCOPOLAMINE HYDROBROMIDE	114-49-8	28
SCOPOLAMINE HYDROBROMIDE	51-34-3	37
SCORPION VENOM		96
SEBACIC ACID	111-20-6	42
SELENIUM	7782-49-2	45
SELENIUM SULFIDE	7446-34-6	31
SELENIUM SULFIDE	7446-34-6	116
SELSUIN		22
SEROTONIN		92
SEROTONIN	50-67-9	96
SESAMOL	533-31-3	6
SESAMOL	533-31-3	8
SIDE STREAM SMOKE		116
SILICA	7631-86-9	70
SILICA	7631-86-9	70
SILVER	7440-22-4	116
SODIUM		87
SODIUM	17341-25-2	94
SODIUM AZIDE	26628-22-9	28
SODIUM AZIDE	26628-22-8	37
SODIUM AZIDE	26628-22-8	42
SODIUM AZIDE	26628-22-8	116
SODIUM BENZOATE		62
SODIUM BISULFITE		13

CHEMICAL	CAS NO.	PAGE
SODIUM CYANIDE	143-33-9	37
SODIUM CYANURATE	2624-17-1	22
SODIUM DODECYL SULFATE	151-21-3	38
SODIUM FLUORIDE	7681-49-4	38
SODIUM FLUORIDE	7681-49-4	42
SODIUM FLUORIDE	7681-49-4	101
SODIUM IODOMETHANESULFONATE	126-31-8	22
SODIUM LAUROYLISETHIONATE	7381-01-3	6
SODIUM LAUROYLISETHIONATE	7381-01-3	8
SODIUM NITRITE	7632-00-0	5
SODIUM SALICYLATE	54-21-7	116
SODIUM SELENATE	13410-01-0	38
SODIUM SELENITE	10102-18-8	6
SODIUM SELENITE	10102-18-8	38
SODIUM THIOCYANATE	540-72-7	5
SODIUM THIOCYANATE	540-72-7	5
SODIUM XYLENESULFONATE	1300-72-7	28
SODIUM XYLENE SULFONATE	1300-72-7	38
SODIUM XYLENESULFONATE	1300-72-7	38
SODIUM XYLENESULFONATE	1300-72-7	42
SOMATASTATIN		94
SORBINIL		99
SPIRO(ISOBENZOFURAN-1 (3H) 9' (9H)XANTHEN)-3-ONE 2',4', 4',7'-TETRABROMO-3',6'-DIHDROXY DISODIUM SALT	17372-87-1	22
STANNOUS CHLORIDE	7772-99-8	31
STAPHYLOCOCCAL ENTEROTOXINS		45
STEARIC ACID	57-11-4	43
STREPTOMYCIN	57-92-1	85
STREPTOZOCIN	18883-66-4	84
STREPTOZOTOCIN	18883-66-4	77
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STRYCHNINE	57-24-9	96
STYRENE	100-42-5	28
STYRENE	100-42-5	116
STYRENE OXIDE	96-09-3	116
STYRENE OXIDE	96-09-5	116
SUCCINIC ACID	110-15-6	43
SUCCINIC ACID 2,2-DIMETHYLHYDRAZIDE	1596-84-5	43
SUCCINIC ANHYDRIDE	108-30-5	38
SUCCINIC ANHYDRIDE	108-30-5	43
SUCCINIMIDES		78
SUCCINYLACETONE	51568-18-4	6
SUCROSE	57-50-1	43
SULFAMETHAZINE	57-68-1	28
SULFAMETHAZINE	57-68-1	43

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
SULFAMETHAZINE	57-68-1	46
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE-N4-GLUCOSIDE		54
SULFAMETHAZINE-N4-GLUCURONIDE		54
SULFAMETHAZINE TRIAZENE		55
SULFAMIC ACID, 1,7-HEPTANEDYL ESTER (NSC-329680)		10
SULFANILAMIDE	63-74-1	82
SULFANILAMIDES		96
SULFAPYRAZINE	116-44-9	96
SULFISOXAZOLE	127-69-5	31
SULFITES		90
SULFOLENE	126-33-0	116
3-SULFOLENE	77-79-2	43
SULFUR DIOXIDE	7446-09-5	116
SULFUR DIOXIDE	7446-09-5	116
SULFUR DIOXIDE	7446-09-5	116
SULFURIC ACID	7664-93-9	117
SUPEROXIDE ANION		100
SUPEROXIDE ANION		100
SUPEROXIDE ANION		100
SUPROFEN		100
SYNTHETIC PYRETHROIDS		96
TALC	14807-96-6	38
TALC	14807-96-6	43
TAMOXIFEN		59
TAMOXIFEN		54
TARA GUM	39300-88-4	22
1,2,3,4-TCDD	30746-58-8	22
TENUAZONIC ACID		45
TERATOGENIC AGENTS		84
TERATOGENIC AGENTS		84
TERBUTALINE	23031-25-6	57
TERBUTALINE	23031-25-6	100
TESTOSTERONE	58-22-0	55
TETANUS TOXIN		86
TETANUS TOXIN		96
1,2,4,5-TETRACHLOROBENZENE	95-94-3	13
1,2,4,5-TETRACHLOROBENZENE	95-94-3	15
1,2,4,5-TETRACHLOROBENZENE	95-94-3	38
1,1,2,3-TETRACHLORO-BUTADIENE	921-09-5	22
2,3,7,8-TETRACHLORO-DIBENZO-P-DIOXIN	1746-01-6	13
TETRACHLORODIPHENYLETHANE	72-54-8	28
1,1,2,2-TETRACHLOROETHANE	79-34-5	43

CHEMICAL	CAS NO.	PAGE
TETRACHLOROETHYLENE	127-18-4	38
TETRACHLOROETHYLENE	127-18-4	117
2,3,5,6-TETRACHLORO-4-NITROANISOLE	2438-88-2	22
2,3,4,5-TETRACHLOROPHENOL	4901-51-3	28
2,3,4,6-TETRACHLOROPHENOL	58-90-2	28
2,3,7,8-TETRACHLOROPHENOL		117
TETRACHLOROPHTHALIC ANHYDRIDE	117-08-8	32
TETRACHLOROPHTHALIC ANHYDRIDE	117-08-8	38
TETRACHLORVINPHOS	961-11-5	28
TETRACHROMIC ACID, POTASSIUM ZINC SALT	12433-50-0	22
TETRACYCLINE HYDROCHLORIDE	64-75-5	38
TETRAETHYLENEPENTAMINE	112-57-2	32
TETRAFLUOROETHYLENE	116-14-3	22
TETRAFLUOROETHYLENE	116-14-3	28
TETRAFLUOROETHYLENE	116-14-3	38
TETRAHYDROCANNABINOL	1972-08-3	55
DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	104
1-TRANS-DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	38
1-TRANS-DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	32
TETRAHYDROFURAN	109-99-9	13
TETRAHYDROFURAN	109-99-9	15
TETRAHYDROFURAN	109-99-9	38
TETRAHYDROFURAN	109-99-9	117
TETRAKIS(HYDROXYMETHYL) PHOSPHONIUM SULFATE	55566-30-8	28
3,3',5,5'-TETRAMETHYLBENZIDINE	54827-17-7	32
N,N,N',N'-TETRAMETHYLPARAROSANILINE		55
N,N,N',N'-TETRAMETHYL-P-PHENYLENEDIAMINE	100-22-1	28
TETRANITROMETHANE	509-14-8	28
TETRANITROMETHANE	509-14-8	38
1,3,6,8-TETRANITROPYRENE	28767-61-5	22
TETRODOTOXIN	4368-28-9	67
TETRODOTOXIN		87
TETRODOTOXIN		87
TETRODOTOXIN	4368-28-9	90
TETRODOTOXIN	4368-28-9	91
TETRODOTOXIN		91
TETRODOTOXIN	4368-28-9	93
TETRODOTOXIN	4368-28-9	96
TETRODOTOXIN	4368-28-9	96
TETROTOXIN, VENOMS,		94
THALLIUM	7440-28-0	117
THEOPHYLLINE	56-55-9	15
THEOPHYLLINE	58-55-9	38
THEOPHYLLINE		92
THIOACETAMIDE	62-55-5	78
4,4'-THIOBIS-(6-T-BUTYL -CRESOL)	96-69-5	13
4,4'-THIOBIS(6-TERT-BUTYL-MCRESOL)	96-69-5	38
THICCOLCHICINE	2730-71-4	78

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
THIOCOLCHICINE ANALOGS		78
4,4'-THIODIANILINE	139-65-1	28
6-THIOGUANINE		117
THIOPHANATE M	23564-05-8	22
THIOPHENE	110-02-1	38
THIOPHENOL		117
THIORIDAZINE		100
TIMOLOL		100
TIN	7440-31-5	90
TITANIUM DIOXIDE	13463-67-7	32
TITANIUM FERROCENE	1271-19-8	38
TITANOCENE DICHLORIDE	1271-19-8	13
TITANOCENE DICHLORIDE	1271-19-8	28
TITANOCENE DICHLORIDE	1271-19-8	43
TOBACCO SMOKE		70
TOBACCO SMOKE		70
TOBACCO SMOKE COMPONENTS		67
TOBRAMYCIN	32986-56-4	78
TOBRAMYCIN	32986-56-4	85
TOBRAMYCIN	32986-56-4	100
TOLAZAMIDE	1156-19-0	43
TOLBUTAMIDE	64-77-7	43
TOLUENE	108-88-3	38
TOLUENE	108-88-3	117
TOLUENE	108-88-3	43
2,6-TOLUENEDIAMINE DIHYDROCHLORIDE	15481-70-6	32
2,5-TOLUENEDIAMINE SULFATE	6369-59-1	43
TOLUENE DIISOCYANATE	26471-62-5	70
2,4-TOLUENE DIISOCYANATE	584-84-9	28
2,4-&2,6-TOLUENE DIISOCYANATE	26471-62-5	28
TOLUENE (NITRATION GRADE)	108-88-3	28
P-TOLUIC ACID	25567-10-6	22
O-TOLUIDINE	95-53-4	117
P-TOLUNITRILE	104-85-8	22
TOXALBUMINS (PLANT)		94
TOXAPHENE		117
TOXIN B (CLOSTRIDIUM)		78
TPA	41479-14-5	35
TRANQUILIZERS		95
TRIADIMEFON	43121-43-3	117
TRIADIMENOL	55219-65-3	117
TRIALLYL ISOCYANURATE	1025-15-6	28
TRIAMTERENE	396-01-0	38
TRIAMTERENE	396-01-0	43
TRIBENZYL ISOCYANURATE	606-03-1	22
TRIBUTYL PHOSPHATE	126-73-8	22
TRICAPKYLIN	538-23-8	38
TRICHLORFON	52-68-6	38

CHEMICAL	CAS NO.	PAGE
TRICHLOROACETIC ACID	76-03-9	117
TRICHLOROACETONITRILE	545-06-2	117
2,4,6-TRICHLOROANILINE	634-93-5	22
1,2,3-TRICHLOROBENZENE	87-61-6	117
TRICHLOROBENZOIC ACIDS	1319-85-3	96
TRICHLOROETHANE	71-55-6	117
1,1,1-TRICHLOROETHANE	71-55-6	13
1,1,1-TRICHLOROETHANE	71-55-6	15
1,1,1-TRICHLOROETHANE	71-55-6	15
1,1,2-TRICHLOROETHANE	79-00-5	28
1,1,2-TRICHLOROETHANE	79-00-5	32
1,1,1-TRICHLOROETHANE	71-55-6	38
TRICHLOROETHYLENE	79-01-6	117
TRICHLORO-ETHYLENE	79-01-6	13
TRICHLOROETHYLENE (WITHOUT EPICHLOROHYDRIN)	79-01-6	32
TRICHLOROMELAMINE	7673-09-8	22
2,4,6-TRICHLORONITROBENZENE	18708-70-8	22
3,4,6-TRICHLORO-2-NITROPHENOL	82-62-2	22
2,3,5-TRICHLOROPHENOL	933-78-8	28
2,4,5-TRICHLOROPHENOL	95-95-4	117
2,4,6-TRICHLOROPHENOL	88-06-2	117
2,4,6-TRICHLOROPHENOL4'NITROPHENYL ETHER		117
1,2,3-TRICHLOROPROPANE	96-18-4	38
1,2,3-TRICHLOROPROPANE	96-18-4	117
1,1,1-TRICHLOROPROPANONE		117
TRICRESYL PHOSPHATE	1330-78-5	38
TRIETHANOLAMINE	102-71-6	38
TRIETHANOLAMINE	102-71-6	38
TRIETHANOLAMINE	102-71-6	38
TRIETHYLPHOSPHINE GOLD		82
TRIETHYLTIN	2767-54-6	118
TRIFLUOROTHYMIDINE	70-00-8	118
TRIFLUOROTHYMIDINE		80
TRIMELLITIC ANHYDRIDE	552-30-7	28
TRIMETHYL ISOCYANURATE	827-16-7	22
TRIMETHYLOLPROPANE TRIACRYLATE	15625-89-5	6
TRIMETHYLOLPROPANE TRIACRYLATE	15625-89-5	8
TRIMETHYLOXONIUM	43625-65-6	96
TRIMETHYLPHOSPHATE	512-56-1	22
TRIMETHYLPHOSPHATE	512-56-1	28
TRIMETHYL-PSORALEN	3902-71-4	45
TRIMETHYLQUINOLINE		118
TRIMETHYLTIN	56-24-6	55
TRIMETHYLTIN	56-24-6	118
TRIMETHYLTIN		65
1,3,6-TRINITROPYRENE	75321-19-6	22
2,4,6-TRINITROTOLUENE	118-96-7	23
TRIORTHOCRESYLPHOSPHATE	78-30-8	13

294

CHEMICAL INDEX

CHEMICAL	CAS NO.	PAGE
TRIORTHOCRESYL-PHOSPHATE	78-30-8	118
TRIPELENNAMINE HYDROCHLORIDE	154-69-8	43
TRIPHENYLPHOSPHITE	101-02-0	118
TRIPHENYLTIN	639-58-7	118
TRIPROLIDINE HCL	6138-79-0	55
TRIPROLIDINE	6138-79-0	55
TRI-N-PROPYLAMINE	102-69-2	23
TRIS(CARBAMOYLMETHYL)ISOCYANURATE	1843-48-7	23
TRIS(2-CHLOROETHYL) PHOSPHATE	115-96-8	38
TRIS(2-CHLOROETHYL) PHOSPHATE	115-96-8	43
TRIS(2,3-EPOXYPROPYL)-CYANURATE	2451-62-9	23
TRIS- (2,3-EPOXYPROPYL) ISOCYANURATE	2451-62-9	28
TRIS(2-ETHYLHEXYL) PHOSPHITE	301-13-3	28
TRIS(2-KETOPROPYL)ISOCYANURATE	61050-97-3	23
TRISODIUM NITRILOTRIACETATE MONOHYDRATE	18662-53-8	23
TRIS(TRIPHENYLSTANNYL)ISOCYANURATE	752-74-9	23
TRITIUM		92
TRITIUM		92
TRITIUM	10028-17-8	87
TRITIUM		94
O-TRITOLYL PHOSPHATE	78-30-8	23
P-TRITOLYL PHOSPHATE	78-32-0	23
TRYPAN BLUE		118
L-TRYPTOPHAN	73-22-3	43
TUMERIC (CURCUMIN)	8024-37-1	38
TURMERIC OLEORESIN (CURCUMIN)	8024-37-1	43
TURMERIC, OLEORESIN (CURCUMIN)	8024-37-1	28
URANIUM-238		118
URETHANE	51-79-6	23
URETHANE	51-79-6	32
URETHANE	51-79-6	118
URETHANE	51-79-6	28
UROTROPINE	100-97-0	23
VALERIC ACID	59546E104	118
N-VALERIC ACID	109-52-4	43
VALERONITRILE	110-59-8	23
VALIUM (DIAZEPAM)	439-14-5	28
VALPROIC ACID	99-66-1	84
VALPROIC ACID	59546E104	118
VALPROIC ACID	99-66-1	63
VALPROIC ACID (DIPROPYLACETIC ACID)		78
VANADIUM PENTOXIDE	1314-62-1	23
VANADIUM PENTOXIDE		58
VENOMS		85
VENOMS		96
VENOMS		94
VERAPAMIL	52-53-9	67
VERAPAMIL	52-53-9	57
VERATRIDINE	71-62-5	96
VINBLASTINE	865-21-4	96
VINYL CARBAMATE		118
4-VINYL CYCLOHEXENE	100-40-3	15
VINYL CYCLOHEXENE DIOXIDE	106-87-6	38
P-VINYL GUAIACOL	7786-61-0	7
P-VINYL GUAIACOL	7786-61-0	8
VINYLIDENE FLUORIDE	75-38-7	15
VINYLIDENE FLUORIDE	75-38-7	23
VINYLIDENE CHLORIDE (1,1-DICHLOROETHYLENE)	75-35-4	29
VINYLIDENE FLUORIDE	75-38-7	29
VINYLIDENE CHLORIDE (1,1DICHLOROETHYLENE	75-35-4	43
VINYLIDENE CHLORIDE	75-35-4	78
VINYL TOLUENE	25013-15-4	38
VITAMIN A	68-26-8	82
VITAMIN D	1406-16-2	23
VITAMIN E		45
VOLATILE ORGANIC DRINKING WATER CONTAMINANTS		118
VOLATILE SOLVENTS		11
VOMITOXIN	17924-92-4	45
WOLLASTONITE CALCIUM SILICATE	13983-17-0	38
WOLLASTONITE CALCIUM SILICATES	13983-17-0	29
WOLLASTONITE CALCIUM SILICATES	13983-17-0	43
WOOD STOVE EMISSIONS		118
XANTHENES		83
M-XYLENE	108-38-3	118
P-XYLENE	106-42-3	118
XYLENES	1330-20-7	118
XYLENES, COMMERCIAL MIXTURE	1330-20-7	29
ZEARALENONE	17924-92-4	45
ZINC COMPOUNDS		88
ZIRCONIUM OXYCHLORIDE	7699-43-6	7

0295

CAS Registry Number Index

CAS NUMBER INDEX

CAS	PAGE
50-00-0	75
50-02-2	49
50-02-2	49
50-02-2	49
50-06-6	54
50-06-6	57
50-06-6	77
50-06-6	84
50-06-6	84
50-06-6	91
50-06-6	95
50-06-6	115
50-18-0	25
50-18-0	68
50-18-0	81
50-18-0	109
50-28-2	50
50-28-2	50
50-28-2	50
50-29-3	25
50-29-3	88
50-29-3	109
50-32-8	24
50-32-8	48
50-32-8	48
50-32-8	48
50-32-8	74
50-32-8	74
50-32-8	107
50-33-9	37
50-53-3	81
50-53-3	87
50-55-5	54
50-55-5	96
50-55-5	96
50-55-5	116
50-67-9	96
50-76-0	47
50-81-7	30
50-81-7	44
51-06-9	57
51-06-9	57
51-06-9	82
51-21-8	111
51-28-8	50
51-34-3	37
51-34-3	96
51-41-2	87
51-41-2	94
51-43-4	18
51-43-4	26
51-43-4	41
51-43-4	90
51-45-6	89
51-61-6	81
51-61-6	84
51-61-6	87
51-61-6	89
51-61-6	89
51-79-6	23
51-79-6	28
51-79-6	32
51-79-6	118
51-83-2	86
51-84-3	85
51-84-3	85
51-84-3	93
52-53-9	57
52-53-9	67
52-67-5	57
52-67-5	82
52-68-6	38
52-86-8	95
53-86-1	95
53-94-1	51
53-94-1	51
53-94-1	51
53-95-2	50
53-95-2	50
53-96-3	47
53-96-3	47
53-96-3	47
53-96-3	47
53-96-3	47
53-96-3	47
53-96-3	106
54-11-5	63
54-11-5	114
54-21-7	116
54-31-9	26
54-31-9	35
54-31-9	75
54-92-2	76
54-95-5	90
54-95-5	95
55-31-2	35
55-38-9	111
55-63-0	94
55-91-4	110
55-98-1	31
56-23-0	107
56-23-5	24
56-23-5	30
56-23-5	74
56-24-6	55
56-24-6	118
56-35-9	117
56-38-2	115
56-47-5	63
56-49-5	76
56-49-5	113
56-53-1	49
56-53-1	59
56-53-1	83
56-53-1	110
56-54-2	71
56-54-2	84
56-55-3	48
56-55-3	74
56-55-3	107
56-65-5	86
56-65-6	83
56-72-4	40
57-11-4	43
57-24-9	96
57-27-2	90
57-41-0	37
57-41-0	42
57-41-0	49
57-41-0	49
57-41-0	49
57-41-0	57
57-41-0	57
57-41-0	84
57-41-0	86
57-41-0	88
57-41-0	91
57-41-0	95
57-50-1	43
57-57-8	116
57-66-9	27
57-66-9	37
57-66-9	42
57-66-9	84
57-68-1	28
57-68-1	43
57-68-1	46
57-68-1	54
57-68-1	54
57-68-1	54
57-68-1	54
57-68-1	54
57-68-1	54
57-74-9	108
57-83-0	54
57-88-5	87
57-92-1	85
57-97-6	35
57-97-6	35
57-97-6	49
57-97-6	49
57-97-6	49
57-97-6	110
58-00-4	86
58-08-2	44
58-08-2	44
58-08-2	64
58-08-2	107
58-22-0	55
58-32-2	89
58-33-3	37
58-33-3	42
58-55-9	15
58-55-9	38
58-89-9	41
58-89-9	51
58-89-9	51
58-89-9	51
58-89-9	112
58-89-9	112
58-90-2	28
58-93-5	4
58-93-5	4
58-93-5	36
59-01-8	85
59-01-8	99
59-05-2	82
59-05-2	82
59-05-2	102
59-05-2	112
59-33-6	42
59-50-7	17

CAS NUMBER INDEX

CAS	PAGE
59-52-9	110
59-87-0	37
59-92-7	82
59-92-7	89
59-96-1	95
60-11-7	110
60-13-9	24
60-13-9	30
60-13-9	33
60-13-9	39
60-29-7	19
60-29-7	111
60-51-5	40
60-57-1	25
60-57-1	110
60-92-4	88
61-82-5	39
62-23-7	37
62-44-2	42
62-44-2	71
62-50-0	111
62-55-5	78
62-73-7	35
62-75-9	2
62-75-9	2
62-75-9	49
62-75-9	75
62-75-9	110
63-25-2	107
63-25-2	107
63-74-1	82
64-17-5	19
64-17-5	31
64-17-5	66
64-17-5	85
64-17-5	111
64-17-5	111
64-18-6	19
64-18-6	35
64-18-6	41
64-19-7	16
64-19-7	39
64-69-7	19
64-75-5	38
64-77-7	43
64-86-8	87
64-86-8	88
64-86-8	109
65-85-0	74
66-27-2	113
66-27-3	52
66-27-3	52
66-27-3	52
66-97-7	45
66-97-7	82
67-20-9	27
67-20-9	37
67-20-9	56
67-20-9	56
67-20-9	69
67-20-9	69
67-20-9	69
67-64-1	12
67-64-1	24
67-64-1	33
67-66-3	108
67-68-5	18
67-68-5	26
67-72-1	35
67-72-1	41
68-12-2	30
68-12-2	49
68-26-8	82
69-65-8	31
69-65-8	112
70-00-8	118
70-25-7	113
70-30-4	26
70-30-4	69
71-43-2	14
71-43-2	30
71-43-2	107
71-55-6	13
71-55-6	15
71-55-6	15
71-55-6	38
71-55-6	117
71-62-5	96
72-54-8	28
72-55-9	12
72-56-0	25
73-22-3	43
73-49-4	22
74-11-3	17
74-82-8	20
74-83-9	20
74-83-9	36
74-87-3	20
74-96-4	35
74-96-4	41
75-00-3	19
75-00-3	26
75-00-3	35
75-05-8	33
75-07-0	24
75-09-2	18
75-09-2	25
75-09-2	40
75-09-2	113
75-12-7	31
75-15-0	24
75-21-8	19
75-21-8	26
75-21-8	31
75-21-8	111
75-25-2	12
75-25-2	33
75-34-3	18
75-34-3	25
75-35-4	29
75-35-4	43
75-35-4	78
75-38-7	15
75-38-7	23
75-38-7	29
75-44-5	115
75-47-8	41
75-52-5	37
75-56-9	27
75-56-9	31
75-56-9	42
75-60-5	107
75-65-0	33
75-65-0	58
75-83-2	18
76-03-9	117
76-06-2	25
76-06-2	109
76-38-0	20
76-44-8	41
76-57-3	34
77-09-8	37
77-47-4	26
77-47-4	35
77-47-4	41
77-65-6	39
77-79-2	43
77-92-9	40
78-11-5	27
78-11-5	37
78-30-8	13
78-30-8	23
78-30-8	118
78-32-0	23
78-34-2	41
78-44-4	24
78-44-4	33
78-78-4	19
78-78-4	26
78-78-4	31
78-79-5	14
78-79-5	26
78-79-5	31
78-79-5	36
78-84-2	36
78-88-6	25
78-89-7	17
78-93-3	58
78-94-4	21
79-00-5	28
79-00-5	32
79-01-6	13
79-01-6	32
79-01-6	117
79-01-7	108
79-06-1	24
79-06-1	30
79-06-1	73
79-06-1	87
79-06-1	106
79-06-1	106
79-09-4	22
79-09-4	42
79-11-8	36
79-11-8	113
79-20-9	41
79-29-8	18
79-34-5	43
79-43-6	109
80-05-7	30
80-62-6	113
80-62-6	113

CAS NUMBER INDEX

CAS	PAGE
81-07-2	45
81-07-2	54
81-07-2	54
81-07-2	54
81-11-8	25
81-11-8	34
81-11-8	40
81-20-9	18
81-49-2	24
81-49-2	33
81-49-2	39
81-55-0	30
82-28-0	24
82-28-0	106
82-62-2	22
83-32-9	16
83-38-5	18
83-43-2	90
83-43-2	95
83-72-7	31
84-66-2	12
84-66-2	14
84-66-2	35
84-66-2	40
84-74-2	34
84-74-2	40
84-74-2	109
85-44-9	42
85-44-9	115
85-68-7	33
86-30-6	27
86-50-0	24
86-50-0	106
86-54-4	56
86-54-4	56
86-57-7	52
87-61-6	117
87-68-3	12
87-68-3	14
87-68-3	41
87-86-5	37
87-86-5	37
87-86-5	42
88-06-2	117
88-21-1	16
88-75-5	31
88-85-1	110
88-89-1	27
88-96-0	115
88-99-3	22
89-63-4	34
89-98-5	17
90-00-6	19
90-13-1	17
91-20-3	27
91-20-3	36
91-23-6	14
91-23-6	37
91-58-7	17
91-59-8	52
91-59-8	114
91-62-3	27
91-64-5	34
91-64-5	40
91-84-9	28
91-84-9	54
91-84-9	54
91-84-9	54
91-84-9	54
91-84-9	54
91-84-9	54
91-93-0	25
92-36-4	36
92-36-4	41
92-67-1	47
92-67-1	47
92-67-1	106
92-67-1	106
92-87-3	12
92-87-5	30
92-87-5	48
92-87-5	107
92-93-3	52
93-05-0	25
93-15-2	36
93-46-9	26
93-58-3	20
94-75-7	110
95-14-7	16
95-48-7	34
95-50-1	14
95-50-1	30
95-50-1	109
95-51-2	39
95-53-4	117
95-54-5	27
95-57-8	109
95-74-9	30
95-74-9	40
95-80-7	30
95-83-0	30
95-85-2	16
95-94-3	13
95-94-3	15
95-94-3	38
95-95-4	117
96-09-3	116
96-09-5	116
96-12-8	12
96-12-8	74
96-13-9	25
96-13-9	34
96-18-4	38
96-18-4	117
96-29-7	6
96-29-7	20
96-29-7	27
96-31-1	40
96-37-7	20
96-45-7	35
96-48-0	33
96-48-0	39
96-69-5	13
96-69-5	38
96-93-5	16
97-02-9	18
97-02-9	40
97-23-4	20
97-63-2	111
97-90-5	6
97-90-5	8
98-01-1	35
98-56-6	6
98-56-6	8
98-83-9	21
98-83-9	27
98-85-1	36
98-88-4	16
98-88-4	33
99-30-9	30
99-56-9	31
99-57-0	33
99-66-1	63
99-66-1	84
99-66-1	88
99-75-2	21
99-99-0	37
99-99-0	42
100-01-6	37
100-02-7	37
100-02-7	42
100-02-7	52
100-22-1	28
100-40-3	15
100-41-4	111
100-42-5	28
100-42-5	116
100-44-7	24
100-47-0	24
100-47-0	33
100-51-6	33
100-52-7	33
100-64-1	6
100-90-3	47
100-90-3	47
100-97-0	23
101-02-0	118
101-54-2	42
101-67-7	26
101-70-2	25
101-72-4	27
101-73-5	26
101-77-9	20
101-80-4	31
102-50-1	25
102-54-5	35
102-69-2	23
102-71-6	38
102-71-6	38
102-71-6	38
102-96-5	21
102-96-5	27
103-50-4	21
103-70-8	19
103-85-5	42
103-89-9	16
103-90-2	24
103-90-2	36
103-90-2	39
103-90-2	47
103-90-2	47
103-90-2	47

0299

BLANK PAGE

CAS NUMBER INDEX

CAS	PAGE
103-90-2	73
103-90-2	81
103-90-2	97
104-55-2	48
104-55-2	48
104-76-7	14
104-76-7	26
104-85-8	22
104-88-1	17
104-91-6	21
105-60-2	30
105-67-9	110
105-87-3	31
106-42-3	118
106-43-4	17
106-44-5	34
106-46-7	40
106-46-7	109
106-47-8	34
106-47-8	39
106-65-0	18
106-70-7	41
106-87-6	38
106-88-7	41
106-89-8	31
106-89-8	75
106-89-8	111
106-92-3	33
106-92-3	39
106-93-4	18
106-93-4	30
106-93-4	49
106-93-4	75
106-93-4	109
106-97-8	16
106-97-8	24
106-97-8	30
106-99-0	14
106-99-0	16
106-99-0	24
106-99-0	30
106-99-0	33
106-99-0	39
107-02-8	68
107-02-8	68
107-02-8	106
107-05-1	47
107-06-2	25
107-06-2	34
107-06-2	34
107-06-2	110
107-11-9	66
107-12-0	27
107-13-1	11
107-18-6	106
107-21-1	35
107-21-1	50
107-21-1	111
107-29-9	2
107-31-3	20
107-31-3	42
107-44-8	51
107-44-8	51
107-87-9	21
107-92-6	17
107-92-6	39
107-92-6	107
108-10-1	20
108-10-1	58
108-21-4	19
108-30-5	38
108-30-5	43
108-38-3	118
108-39-4	34
108-42-9	39
108-45-2	27
108-46-3	13
108-46-3	37
108-86-1	33
108-86-1	33
108-86-1	39
108-86-1	74
108-86-1	107
108-88-3	28
108-88-3	38
108-88-3	43
108-88-3	113
108-88-3	117
108-90-7	108
109-06-8	113
109-52-4	43
109-66-0	21
109-86-4	20
109-99-9	13
109-99-9	15
109-99-9	38
109-99-9	117
110-00-9	26
110-00-9	35
110-02-1	38
110-15-6	43
110-46-3	6
110-49-6	27
110-54-3	12
110-54-3	14
110-54-3	26
110-54-3	36
110-54-3	41
110-59-8	23
110-62-3	21
110-69-0	6
110-80-5	35
110-86-1	37
110-86-1	116
110-91-0	113
110-94-1	41
111-14-8	19
111-20-6	42
111-30-8	35
111-30-8	35
111-30-8	44
111-30-8	101
111-42-2	35
111-42-2	35
111-42-2	35
111-71-7	19
111-76-2	12
111-76-2	12
111-76-2	24
111-84-2	21
111-87-5	58
111-94-4	112
112-30-1	58
112-34-5	18
112-52-7	20
112-56-1	39
112-57-2	32
112-61-8	42
113-45-1	62
114-49-8	28
115-07-1	22
115-07-1	27
115-07-1	31
115-07-1	42
115-09-3	52
115-09-3	113
115-28-6	24
115-29-7	26
115-29-7	111
115-96-8	38
115-96-8	43
116-14-3	22
116-14-3	28
116-14-3	38
116-44-9	96
117-08-8	32
117-08-8	38
117-39-5	22
117-39-5	28
117-39-5	37
117-39-5	42
117-81-7	110
118-42-3	82
118-52-5	40
118-71-8	27
118-71-8	31
118-74-1	26
118-74-1	112
118-91-2	17
118-96-7	23
119-34-6	24
119-53-9	30
119-84-6	25
119-84-6	35
119-84-6	40
119-90-4	35
119-90-4	49
119-93-7	35
119-93-7	49
120-12-7	44
120-32-1	33
120-32-1	39
120-40-1	27
120-40-1	36
120-40-1	41
120-71-8	25
120-83-2	34
121-14-2	41
121-19-7	28
121-19-7	31
121-19-7	37
121-54-0	33

CAS NUMBER INDEX

CAS	PAGE
121-59-5	17
121-66-4	24
121-69-7	35
121-75-5	41
121-79-9	31
121-88-0	33
121-92-6	37
122-04-3	27
122-19-0	18
123-31-9	31
123-31-9	36
123-33-1	112
123-72-8	33
123-77-3	24
123-77-3	33
123-86-4	48
123-91-1	44
124-18-5	17
124-87-8	95
125-33-7	6
125-33-7	8
126-07-8	89
126-07-8	111
126-31-8	22
126-33-0	116
126-73-8	22
126-99-8	25
126-99-8	30
126-99-8	34
127-00-4	14
127-18-4	38
127-18-4	115
127-18-4	117
127-69-5	31
128-37-0	97
128-37-0	107
128-66-5	25
128-66-5	40
129-15-7	114
130-17-6	33
131-11-3	12
131-11-3	14
131-11-3	26
131-11-3	35
131-11-3	40
131-18-0	12
131-57-7	14
131-57-7	26
131-57-7	36
131-57-7	36
132-98-9	37
133-06-2	24
134-31-6	31
134-32-7	27
134-32-7	52
134-50-9	33
134-72-5	26
135-20-6	25
135-88-6	14
135-88-6	27
135-88-6	37
135-88-6	42
136-77-6	36
137-09-7	34
137-58-6	90
139-13-9	31
139-65-1	28
139-94-6	27
140-11-4	11
140-11-4	33
140-11-4	107
140-49-8	17
140-49-8	39
140-56-7	41
140-88-5	111
140-88-5	111
141-32-2	24
141-32-2	30
141-32-2	48
141-75-3	17
141-78-6	26
141-82-2	41
142-47-2	21
142-47-2	113
142-62-1	39
142-84-7	110
142-96-1	17
143-08-8	58
143-33-9	37
143-50-0	39
143-50-0	108
144-57-5	111
144-62-7	42
147-24-0	26
147-24-0	35
147-24-0	41
147-47-7	35
147-94-4	17
148-18-5	110
148-24-3	31
148-82-3	20
149-30-4	36
149-30-4	41
150-68-5	42
150-68-5	113
151-21-3	38
151-67-7	72
151-67-7	76
151-67-7	89
153-78-6	48
154-69-8	43
156-10-5	27
156-59-2	40
156-59-2	110
156-60-5	40
156-62-7	39
203-64-5	17
205-99-2	16
207-08-9	16
225-51-4	74
262-12-4	40
271-89-6	33
289-95-2	84
298-00-0	42
298-46-4	84
298-46-4	86
298-46-4	86
298-59-9	36
298-81-7	20
298-81-7	27
298-81-7	36
298-81-7	41
298-81-7	44
298-81-7	44
298-81-7	99
299-42-3	56
300-62-9	48
300-62-9	56
301-13-3	28
302-79-4	54
302-79-4	82
302-79-4	116
303-47-9	27
303-47-9	37
303-47-9	77
304-55-2	110
305-03-3	108
309-00-2	16
311-45-5	53
311-45-5	53
313-05-3	88
313-05-3	88
315-18-4	21
320-67-2	106
320-67-2	16
320-67-2	106
333-27-7	21
333-41-5	109
346-18-9	22
350-03-8	106
357-57-3	107
366-70-1	116
371-86-8	113
379-79-3	6
379-79-3	8
389-08-2	36
396-01-0	38
396-01-0	43
404-86-4	107
428-59-1	19
439-14-5	17
439-14-5	28
439-14-5	88
439-14-5	88
446-86-6	16
446-86-6	81
461-89-2	83
464-10-8	16
465-65-6	90
469-21-6	50
469-21-6	50
469-21-6	50
469-21-6	50
470-82-6	48
470-82-6	48
470-82-6	48
471-46-5	53
476-66-4	26
477-30-5	88
477-30-5	109
484-20-8	44
486-25-9	6

CAS NUMBER INDEX

CAS	PAGE
486-25-9	8
487-79-6	84
487-79-6	84
487-79-6	89
488-41-5	30
498-21-5	21
500-66-3	21
503-30-0	28
504-88-1	114
509-14-8	28
509-14-8	38
510-15-6	39
512-56-1	22
512-56-1	28
518-28-5	6
518-28-5	8
518-75-2	44
520-18-3	6
520-18-3	8
525-66-6	57
525-66-6	99
527-62-8	16
530-66-5	31
532-27-4	25
532-27-4	34
532-27-4	39
533-31-3	6
533-31-3	8
534-22-5	20
535-80-8	17
536-33-4	19
536-33-4	26
536-33-4	41
538-23-8	38
538-74-9	16
540-72-7	5
540-72-7	5
541-53-7	110
542-56-3	6
542-56-3	36
543-67-9	6
545-06-2	117
548-62-9	50
548-62-9	50
548-62-9	50
552-16-9	21
552-16-9	27
552-30-7	28
554-00-7	18
554-12-1	42
554-84-7	31
555-30-6	36
555-30-6	41
555-30-6	56
555-30-6	56
556-52-5	35
557-11-9	39
562-10-7	26
562-10-7	41
563-47-3	30
575-43-9	18
583-39-1	36
583-39-1	41
584-79-2	85
584-84-9	28
589-18-4	20
594-42-3	21
594-71-8	17
598-55-0	41
598-55-0	113
599-79-1	28
599-79-1	37
599-79-1	82
602-60-8	27
603-47-4	54
603-47-4	54
604-75-1	21
604-75-1	27
605-71-0	18
606-03-1	22
607-30-7	51
607-30-7	51
607-57-8	52
607-57-8	114
608-93-5	37
609-20-1	30
609-20-1	110
611-19-8	18
611-32-5	27
612-60-2	27
613-47-8	51
613-47-8	51
614-00-6	3
614-45-9	33
614-95-9	21
616-23-9	110
619-17-0	42
621-33-0	21
621-90-9	52
623-42-7	39
624-18-0	31
624-24-8	42
624-83-9	6
624-83-9	8
624-83-9	13
625-48-9	21
625-86-5	18
629-14-1	14
630-08-0	107
630-08-0	107
630-60-4	66
634-93-5	22
635-65-4	72
637-92-3	20
638-21-1	22
639-58-7	118
643-22-1	35
643-22-1	41
680-31-9	31
684-93-5	3
684-93-5	52
689-13-4	83
709-98-8	54
745-65-3	95
752-74-9	23
759-73-9	111
768-52-5	20
827-16-7	22
828-00-2	35
832-28-8	21
834-28-6	42
842-07-9	30
865-21-4	96
868-85-9	12
874-42-0	18
920-66-1	19
921-09-5	22
924-42-5	27
924-42-5	36
924-42-5	42
933-78-8	28
935-69-3	52
958-74-7	52
961-11-5	28
968-81-0	16
968-81-0	39
989-38-3	28
989-38-8	37
999-81-5	39
1025-15-6	28
1071-83-6	14
1103-38-4	6
1103-38-4	8
1116-54-7	2
1116-54-7	42
1120-71-4	114
1122-54-9	16
1122-54-9	24
1156-19-0	43
1199-18-4	89
1208-52-2	17
1212-29-9	40
1260-17-9	17
1271-19-8	13
1271-19-8	28
1271-19-8	38
1271-19-8	43
1300-71-6	18
1300-72-7	28
1300-72-7	38
1300-72-7	38
1300-72-7	42
1303-00-0	12
1303-00-0	14
1303-00-0	19
1313-27-5	36
1313-27-5	42
1313-99-1	37
1314-62-1	23
1319-77-3	34
1319-85-3	96
1321-94-4	21
1325-37-7	34
1330-20-7	29
1330-20-7	118
1330-78-5	38
1332-21-4	68
1332-21-4	106
1332-58-7	69
1332-58-7	69
1338-23-4	33
1397-89-3	16

CAS NUMBER INDEX

CAS	PAGE
1397-89-3	24
1397-89-3	106
1399-60-6	89
1402-68-2	44
1402-68-2	44
1403-66-3	56
1403-66-3	75
1403-66-3	75
1403-66-3	75
1403-66-3	85
1403-66-3	98
1404-04-2	85
1404-19-9	95
1406-16-2	23
1415-93-6	112
1420-04-8	17
1465-25-4	42
1570-64-5	17
1571-08-0	20
1596-84-5	43
1606-67-3	48
1634-78-2	31
1634-78-2	110
1646-75-9	6
1646-75-9	8
1675-54-3	24
1719-53-5	18
1746-01-6	13
1747-10-0	36
1747-60-0	27
1747-60-0	41
1769-41-1	6
1769-41-1	8
1817-73-8	33
1817-73-8	33
1825-21-4	37
1836-75-5	114
1843-48-7	23
1912-24-9	106
1918-02-1	115
1934-21-0	44
1936-15-8	30
1936-15-8	40
1937-37-7	25
1948-33-0	17
1948-33-0	24
1972-08-3	32
1972-08-3	38
1972-08-3	55
1991-78-2	95
2004-04-8	83
2016-88-8	16
2058-46-0	42
2062-78-4	95
2068-78-2	114
2163-80-6	113
2164-17-2	26
2180-92-9	73
2201-15-2	66
2219-30-9	53
2244-16-8	24
2244-16-8	33
2244-16-8	39
2274-11-5	6
2274-11-5	8
2353-33-5	39
2381-21-7	21
2385-85-5	36
2425-85-6	25
2425-85-6	34
2425-85-6	40
2429-74-5	34
2429-74-5	40
2438-88-2	22
2451-62-9	23
2451-62-9	28
2475-45-8	25
2519-30-4	6
2519-30-4	8
2523-37-7	20
2531-84-2	21
2624-17-1	22
2642-98-0	47
2698-41-1	34
2730-71-4	78
2757-90-6	16
2767-54-6	118
2783-94-0	26
2783-94-0	31
2784-94-3	50
2832-40-8	30
2836-00-2	16
2871-01-4	26
3018-12-0	25
3018-12-0	109
3081-14-9	24
3165-93-3	30
3266-23-7	19
3290-92-4	7
3290-92-4	8
3296-90-0	33
3366-61-8	47
3389-71-7	19
3420-97-1	53
3546-10-9	27
3567-69-9	30
3665-80-3	19
3902-71-4	45
4067-16-7	31
4080-31-3	14
4080-31-3	17
4097-22-7	10
4170-30-3	34
4170-30-3	40
4337-65-9	41
4368-28-9	67
4368-28-9	90
4368-28-9	91
4368-28-9	93
4368-28-9	96
4368-28-9	96
4376-20-9	14
4376-20-9	42
4553-62-2	20
4635-87-4	21
4685-14-7	69
4901-51-3	28
5076-20-0	19
5090-36-8	88
5090-36-8	110
5131-58-8	27
5131-60-2	30
5142-23-4	52
5160-02-1	44
5307-14-2	21
5392-40-5	12
5432-28-0	3
5466-84-2	21
5470-11-1	19
5522-43-0	21
5522-43-0	52
5522-43-0	52
5522-43-0	114
5536-17-4	79
5536-17-4	79
5634-39-9	26
5634-39-9	36
59546E104	118
59546E104	118
5989-27-5	36
6041-94-7	17
6055-52-3	26
6055-52-3	36
6055-52-3	36
6088-51-3	17
6098-44-8	47
6109-97-3	24
6112-76-1	20
6112-76-1	31
6112-76-1	56
6112-76-1	56
6138-79-0	55
6138-79-0	55
6164-98-3	108
6201-86-1	16
6265-05-0	16
6265-06-1	16
6287-38-3	18
6317-18-6	14
6317-18-6	20
6358-08-3	16
6358-15-2	16
6358-85-6	25
6358-85-6	40
6369-59-1	43
6373-74-6	25
6373-74-6	33
6373-74-6	40
6375-17-3	16
6459-94-5	34
6459-94-5	40
6471-49-4	25
6471-49-4	34
6637-88-3	17
6673-35-4	57
6789-88-4	19
6810-26-0	51
6959-47-3	39
6959-48-4	40
7166-19-0	14
7166-19-0	16
7234-04-0	52

0303

CAS NUMBER INDEX

CAS	PAGE
7320-37-8	35
7381-01-3	6
7381-01-3	8
7428-83-3	47
7429-90-5	56
7429-90-5	81
7439-89-6	76
7439-92-1	62
7439-92-1	84
7439-92-1	89
7439-92-1	112
7439-93-2	103
7439-95-4	90
7439-96-5	44
7439-96-5	84
7440-02-0	114
7440-22-4	116
7440-28-0	117
7440-31-5	90
7440-38-2	81
7440-38-2	106
7440-41-7	68
7440-43-9	44
7440-43-9	107
7440-44-0	87
7440-44-0	88
7440-57-5	81
7440-57-5	81
7440-57-5	81
7440-57-5	81
7446-09-5	116
7446-09-5	116
7446-09-5	116
7446-34-6	31
7446-34-6	116
7447-41-8	112
7459-92-1	62
7481-89-2	10
7487-94-7	12
7487-94-7	36
7487-94-7	56
7487-94-7	56
7487-94-7	76
7487-94-7	112
7487-94-7	112
7496-02-8	52
7535-00-4	75
7631-86-9	70
7631-86-9	70
7632-00-0	5
7664-93-9	117
7673-09-8	22
7681-49-4	38
7681-49-4	42
7681-49-4	101
7683-59-2	56
7683-59-2	56
7683-59-2	84
7683-59-2	99
7699-43-6	7
7722-84-1	98
7722-84-1	98
7722-84-1	98
7725-93-1	20
7758-99-8	34
7772-99-8	31
7778-50-9	22
7782-44-7	69
7782-44-7	69
7782-44-7	69
7782-44-7	69
7782-49-2	45
7782-50-5	68
7783-20-2	106
7786-61-0	7
7786-61-0	8
7787-56-6	16
7789-23-3	42
7990-92-3	108
8001-23-8	37
8001-30-7	11
8001-30-7	11
8001-30-7	11
8001-30-7	34
8001-79-4	24
8001-79-4	34
8003-22-3	14
8003-22-3	17
8003-22-3	34
8021-39-4	17
8022-00-2	90
8024-37-1	28
8024-37-1	38
8024-37-1	43
8065-48-3	88
9000-01-5	19
9000-30-0	19
9000-40-2	20
9002-88-4	22
9002-92-0	31
9003-53-6	22
9005-65-6	27
9005-65-6	35
9005-65-6	42
9008-11-1	83
9008-11-1	99
9009-86-3	77
10024-97-2	53
10026-24-1	17
10026-24-1	34
10028-15-6	69
10028-15-6	69
10028-15-6	115
10028-15-6	115
10028-15-6	115
10028-15-6	115
10028-17-8	87
10034-96-5	36
10034-96-5	41
10043-92-2	116
10049-04-4	108
10049-04-4	108
10101-97-0	37
10102-18-8	6
10102-18-8	38
10102-44-0	114
10102-44-0	114
10102-44-0	114
10108-64-2	44
10108-64-2	107
10124-36-4	107
10125-76-5	53
10143-23-4	18
10277-43-7	20
10326-27-9	16
10326-27-9	33
10356-76-0	41
10361-37-2	106
10595-95-6	3
10599-90-3	34
10599-90-3	108
10599-90-3	108
10605-21-7	24
11023-79-4	83
11024-24-1	18
11054-70-9	89
11056-06-7	69
11077-03-5	95
11097-69-1	24
11097-69-1	48
12000-29-5	58
12001-28-4	58
12002-43-6	19
12035-72-2	21
12035-77-3	37
12224-98-5	17
12433-50-0	22
12778-32-4	86
12789-03-6	24
13014-18-1	21
13014-24-9	21
13029-08-8	18
13073-35-3	75
13284-42-9	21
13410-01-0	38
13463-67-7	32
13552-44-8	31
13684-63-4	20
13743-07-2	2
13743-07-2	9
13755-38-9	66
13765-19-0	39
13765-19-0	107
13838-16-9	75
13961-86-9	27
13961-86-9	37
13961-86-9	42
13983-17-0	29
13983-17-0	38
13983-17-0	43
14371-10-9	40
14490-86-9	50
14797-65-0	4
14807-96-6	38
14807-96-6	43
14838-15-4	57
14838-15-4	57
15078-28-1	66
15096-52-3	109
15356-70-4	20
15356-70-4	31
15356-70-4	112

0304

CAS NUMBER INDEX

CAS	PAGE
15481-70-6	32
15625-89-5	6
15625-89-5	8
15663-27-1	25
15663-27-1	30
15663-27-1	77
15663-27-1	77
15663-27-1	83
15663-27-1	102
15663-29-1	18
16169-16-7	52
16423-68-0	83
17026-81-2	24
17341-25-2	94
17372-87-1	22
17466-45-4	77
17617-23-1	19
17617-23-1	26
17660-46-7	50
17804-35-2	106
17924-92-4	45
17924-92-4	45
18168-01-9	19
18662-53-8	23
18708-70-8	22
18883-66-4	77
18883-66-4	78
18883-66-4	78
18883-66-4	78
18883-66-4	78
18883-66-4	84
19010-66-3	41
19315-64-1	51
19315-64-1	51
19408-74-3	19
19457-37-5	73
19900-46-0	20
20265-97-8	39
20830-81-3	56
20830-81-3	56
20830-81-3	72
20830-81-3	72
20830-81-3	109
21711-65-9	53
21829-25-4	21
22967-92-6	65
22967-92-6	89
22967-92-6	113
23031-25-6	57
23031-25-6	100
23214-92-8	56
23214-92-8	56
23214-92-8	66
23214-92-8	66
23214-92-8	68
23214-92-8	72
23214-92-8	72
23214-92-8	93
23214-92-8	97
23214-92-8	97
23214-92-8	106
23246-96-0	37
23255-93-8	19
23422-53-9	111
23564-05-8	22
23826-72-4	49
24072-75-1	34
24072-75-1	40
24382-04-5	36
25013-15-4	38
25103-58-6	18
25265-71-8	6
25265-71-8	8
25377-73-5	6
25389-94-0	112
25567-10-6	22
25843-45-2	16
25869-00-5	19
25869-00-5	26
25956-17-6	44
26471-62-5	28
26471-62-5	70
26628-22-8	28
26628-22-8	37
26628-22-8	42
26628-22-8	116
26638-28-8	21
27220-47-9	18
28289-54-5	113
28300-74-5	16
28300-74-5	33
28322-02-3	39
28407-37-6	34
28407-37-6	40
28538-70-7	9
28652-72-4	20
28767-61-5	22
28804-88-8	18
29676-71-9	16
29743-15-5	17
30651-40-2	47
30651-40-2	50
30746-58-8	22
31551-45-8	26
32954-58-8	10
32986-56-4	78
32986-56-4	85
32986-56-4	100
33089-61-1	106
33229-34-4	31
33857-26-0	25
34423-54-6	3
34685-67-1	76
35523-89-8	91
35523-89-8	93
35523-89-8	96
35523-89-8	96
35554-08-6	89
35764-59-1	112
35915-19-6	18
36355-01-8	37
37187-49-8	88
37187-49-8	88
37209-28-2	86
37209-28-2	86
37209-28-2	93
37209-28-2	93
38304-91-5	56
39156-41-7	25
39300-88-4	22
39377-38-3	56
39377-38-3	56
39377-38-3	81
39377-38-3	81
39817-09-9	20
40709-29-3	77
40709-29-3	95
41479-14-5	35
42397-64-8	49
42397-65-9	49
43121-43-3	117
43625-65-6	96
50700-49-7	47
51568-18-4	6
52315-07-8	109
52551-67-4	35
52551-67-4	41
52645-53-1	115
52645-53-1	115
52663-84-0	54
52918-63-5	113
54289-46-2	18
54827-17-7	32
55219-65-3	117
55566-30-8	28
55893-12-4	76
55893-12-4	89
56311-56-1	77
57653-85-7	19
57966-42-4	95
58139-59-6	16
59277-89-3	79
59277-89-3	79
59277-89-3	79
59277-89-3	97
59865-13-3	17
59865-13-3	25
59865-13-3	109
60599-38-4	2
60880-63-9	85
61050-97-3	23
61499-28-3	3
61578-04-9	17
61702-44-1	30
61702-44-1	40
61703-05-7	17
63041-77-0	52
63041-90-7	52
63041-90-7	52
63041-90-7	52
63166-73-4	10
63449-39-8	25
63449-39-8	48
63449-39-8	48
63975-21-3	50
67176-33-4	50
68603-42-9	25
68603-42-9	34
68603-42-9	40
68783-78-8	18
71609-23-9	51
71609-25-1	51

CAS NUMBER INDEX

CAS	PAGE	CAS	PAGE	CAS	PAGE	CAS	PAGE
75321-19-6	22						
75321-20-9	49						
75356-79-5	44						
75625-24-0	19						
EMTDP-35	18						
EMTDP-45	22						
EMTDP-49	17						
EMTDP-73	19						
EMTDP-73	26						
NOCAS0884	21						
NOCAS0884	36						

Chemical Index by Study Type

STUDY TYPE INDEX

ACUTE/CHRONIC TOXICITY

CHEMICAL	CAS NO.	PAGE
CADMIUM METALLOTHIONEN		44
COAL LIQUEFACTION MATERIALS		105
DIMETHOXYBENZIDINE	119-90-4	49
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
GENTIAN VIOLET	548-62-9	50
GONADATROPIC RELEASING HORMONE ANALOGS		59
LINDANE	58-89-9	51
P-NITROPHENOL	100-02-7	52
PESTICIDES		115
PHENYLPROPANOLAMINE	14838-15-4	57
PICLORAM	1918-02-1	115
SACCHARIN	81-07-2	45
SACCHARIN	81-07-2	54
SULFAMETHAZINE	57-68-1	46
SULFAMETHAZINE	57-68-1	54

ANALYTICAL CHEMISTRY

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	47
1-NITROPYRENE	5522-43-0	52
1,NITROPYRENE-TRANS-4,5DIHYDRODIOL		53
NITROSAMINE IN PACIFIERS: COMPLIANCE TESTING		53
PENICILLAMINE HYDROCHLORIDE	2219-30-9	53
PYRILAMINE	91-84-9	54

BIOCHEMICAL/CELLULAR TISSUE EFFECT

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	73
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	97
N-ACETOXY-2-ACETYLAMINOFLUORENE	6098-44-8	47
(3H)-N-ACETYL-2-AMINOFLUORENE		47
N-ACETYL-P-BENZOQUINONEIMINE	50700-49-7	47
ACETYLCHOLINE	51-84-3	65
ACETYLCHOLINE	51-84-3	93
N-ACETYL-N-HYDROXY-2-AMINOFLUORENE	30651-40-2	47
ACROLEIN	107-02-8	68
ACROLEIN	107-02-8	68
ACTINOMYCIN D	50-76-0	47
S-ADENOSYL-L-METHIONINE ANALOGS		79
ADRIAMYCIN	23214-92-8	66
ADRIAMYCIN	23214-92-8	68
ADRIAMYCIN	23214-92-8	72
ADRIAMYCIN	23214-92-8	72
ADRIAMYCIN	23214-92-8	97
AEROSOLS		68
AFLATOXIN	1402-68-2	44
ALIPHATIC NITRILES		66
ALLOPUMILIOTOXIN		73
ALLOXAN		97
ALLYLAMINE (ALIPHATIC AMINES)	107-11-9	66
ALUMINUM	7429-90-5	81
AMIKACIN		97
(3H)4-AMINOBIPHENYL		47
4-AMINOBIPHENYL	92-67-1	47
6-AMINOCHRYSENE	2642-98-0	47
2-AMINOFLUORENE	153-78-6	48
5'-AMINOTHYMIDINE		79
ANESTHETICS		91
ANSIOMYCIN		79
ANSIOMYCIN		79
ANSIOMYCIN		79
ANSIOMYCIN		79
ANTIBIOTICS, ADRIAMYCIN	23214-92-8	93
ANTICONVULSANTS		91
ARSINE		12
ASBESTOS	1332-21-4	68
ASBESTOS	1332-21-4	106
ASCORBIC ACID	50-81-7	44
6-AZAURACIL	461-89-2	83
AZIDOTHYMIDINE		79
BACTERIAL ENDOTOXIN		86
BACTERIAL ENDOTOXIN		73
BAPIVACAINE	2180-92-9	73
BARBITURATES		86
BATRACHOTOXININ A	19457-37-5	73
BENZ(C)ACRIDINE	225-51-4	74
BENZANTHRACENE	56-55-3	74
BENZIDINE	92-87-5	48
BENZOIC ACID	65-85-0	74
BENZO(A)PYRENE	50-32-8	74
BENZO(A)PYRENE		105
BENZYL ALCOHOL		72
BERYLLIUM	7440-41-7	68
BILIRUBIN	635-65-4	72
BLEOMYCIN	11056-06-7	68
BROMOBENZENE	108-86-1	74
BUNGAROTOXIN	37209-28-2	86
BUNGAROTOXIN		87
BUNGAROTOXIN	37209-28-2	93
BUNGAROTOXIN	37209-28-2	93
BUPIVACAINE		97
2-BUTOXYETHANOL	111-76-2	12
T-BUTYLATED HYDROXY-ANISOL (BHA)		97
BUTYLATED HYDROXYTOLUENE	128-37-0	107
T-BUTYLATED HYDROXYTOLUENE (BHT)	128-37-0	97
CADMIUM CHLORIDE	10108-64-2	44
CADMIUM SULFIDE		97
CAFFEINE	58-08-2	44
CARBON	7440-44-0	88
CARBON TETRACHLORIDE	56-23-5	74
CARBON TETRACHLORIDE	56-23-0	107
CATECHOLAMINES, L-HYDROXYDOPAMINE		92
CHLORINE GAS	7782-50-5	68
CHLOROFORM	67-66-3	108
CHLOROPROMAZINE	50-53-3	81
CHLORPROMAZINE	50-53-3	87
CHOLERA TOXIN		74
CHOLERA TOXIN		74
CHOLERA TOXIN ADENINE NUCLEOTIDES		83
CHOLESTEROL OXIDES		44
CITRININ	518-75-2	44
CLOMID		59
COFFEE DUST		68
CONTRACEPTIVE ESTROGENS AND PROGESTINS		61
CONTRACEPTIVE STEROIDS		61
COTTON DUST		68
CYCLOPHOSPHAMIDE (TOXIC METABOLITES)	50-18-0	68
CYCLOSPORINE		97
CYCLOSPORINE		97
CYCLOVIR (ACV)	59277-89-3	97
CYTOCHALASIN	37187-49-8	88

BIOCHEMICAL/CELLULAR TISSUE EFFECT

CHEMICAL	CAS NO.	PAGE
DAUNOMYCIN	20830-81-3	72
DAUNOMYCIN	20830-81-3	72
DAUNOMYCIN		72
DDE		109
DDT	50-29-3	109
DEAZUPURINE ANALOGS		79
DECOYININE	2004-04-8	83
4-(DEOXYADENOSIN-6-YL)4-AMINOBIPHENYL		48
4-(DEOXYADENOSIN-6-YL)-2-NAPHTHYLAMINE		48
3-(DEOXYGUANOSINE-N2-YL)-2-ACETYLAMINOFLUORENE		48
N-(DEOXYGUANOSINE-8-YL)-2-ACETYLAMINOFLUORENE		48
N-(DEOXYGUANOSINE-8-YL)-4-AMINOBIPHENYL		48
N-(DEOXYGUANOSINE-8-YL)-2-AMINOFLUORENE		49
DEXAMETHASONE	50-02-2	49
DIBROMOCHLOROPROPANE	96-12-8	74
DIBROMOETHANE	106-93-4	109
DICHLOROACETIC ACID	79-43-6	109
N-(3,5-DICHLOROPHENYL) SUCCINIMIDE		74
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIETHYLSTILBESTROL	56-53-1	59
DIGITALIS		66
DIMETHYL HYDROGEN PHOSPHITE	868-85-9	12
DIMETHYLNITROSAMINE	62-75-9	75
DIMETHYLSUBERIMIDATE		101
DIPYRIDAMOLE	58-32-2	89
DOPAMINE	51-61-6	89
DOPAMINE	51-61-6	81
DOXORUBICIN		72
DOXORUBICIN		72
DOXORUBICIN		72
ENDOTOXIN		98
ENERGY-RELATED MIXTURES		105
ENFLUREANE	13838-16-9	75
EPICHLOROHYDRIN	106-89-8	75
ERYTHROSIN B	16423-68-0	83
ESTROGEN		111
ETHIONINE	13073-35-3	75
ETHYLENE DIBROMIDE	106-93-4	75
ETHYLTHMIDYL(3'-5')DEOXYADENOSINE		50
ETHYLTHYMIDYL(3'-5')DEOXYCYTIDINE		50
TRANS FATTY ACIDS		44
8-(N-FLUOREN-2-YLACETAMIDO)-2'-DEOXYGUANOSINE 5'-MONO PHOSPHATE	14490-86-9	50
8-(N-FLUOREN-2-YLAMINO)-2'DEOXYGUANOSINE 5'-MONO PHOSPHATE	17660-46-7	50

CHEMICAL	CAS NO.	PAGE
FLUORESCEINS		83
FLUOROPHOSPHONATE DERIVATIVES		79
5-FLUOROURACIL		98
FLUOROURIDINE		98
N-FORMYL-N-HYDROXY-2-AMINOFLUORENE	67176-33-4	50
FOSCARNET		80
FOSCARNET		80
FOSCARNET		80
FOSCARNET		80
GALACTOSAMINE	7535-00-4	75
GALLIUM ARSENIDE	1303-00-0	12
GEPHYROTOXIN	55893-12-4	76
GLUTAMATE		98
GLUTARALDEHYDE	111-30-8	101
GOLD	7440-57-5	81
GOLD SODIUM THIOMALATE	39377-38-3	81
GONADATROPIC RELEASING HORMONE ANALOGS		59
HADACIDIN	689-13-4	83
HALOPERIDOL	52-86-8	95
HALOTHANE	151-67-7	89
HALOTHANE	151-67-7	72
HEMATOPORPHYRIN		98
HISTAMINE	51-45-6	89
HISTRIONICOTOXIN	34685-67-1	76
HYDROGEN PEROXIDE	7722-84-1	98
HYDROGEN PEROXIDE	7722-84-1	98
HYDROGEN PEROXIDE	7722-84-1	98
HYDROGEN PEROXIDE		98
N-HYDROXY-2-ACETYLAMINOFLUORENE	53-95-2	50
N-HYDROXY-2-ACETYLAMINOFLUORENE	53-95-2	50
N-HYDROXY-N-ACETYL-2-AMINOFLUORENE	30651-40-2	50
N-HYDROXY-2-AMINOFLUORENE	53-94-1	51
N-HYDROXY-1-AMINOPYRENE		51
HYDROXYEICOSATETRAENOIC ACIDS (HETES)		98
HYDROXYL RADICAL		99
HYDROXYL RADICAL		99
N-HYDROXY-N-PROPIONYL-2AMINOFLUORENE		51
IPRONIAZID	54-92-2	76
IRON	7439-89-6	76
ISOPROTERENOL	7683-59-2	84
ISOQUINOLINES AND RELATED NALOGS		80
KANAMYCIN		99
KAOLIN	1332-58-7	69
KAOLIN	1332-58-7	69
LEVODOPA	59-92-7	82
LIDOCAINE		99
MALONDIALDEHYDE		99
MEPIVACAINE		99

C311

STUDY TYPE INDEX

BIOCHEMICAL/CELLULAR TISSUE EFFECT

CHEMICAL	CAS NO.	PAGE
MERCURIC CHLORIDE	7487-94-7	76
METHAMPHETAMINE		72
5-METHOXYPSORALEN	484-20-8	44
8-METHOXYPSORALEN	298-81-7	99
METHYLCHOLANTHRENE	56-49-5	76
METHYLENE CHLORIDE	75-09-2	113
METHYL METHANESULFONATE	66-27-3	52
MINOXIDIL		72
MONENSIN		72
MONOCROTALINE		69
MONOCROTALINE		69
MORPHINE	57-27-2	90
MYCOTOXINS		88
NEPHROTOXINS		76
NETILMICIN	56311-56-1	77
NETILMICIN		99
NEUROPHARMACOLOGICAL AGENTS		95
NEUROPHARMACOLOGICAL AGENTS		96
NEUROTOXINS		84
NEUROTOXINS		91
NEUROTOXINS		91
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		93
NEUROTOXINS		94
6-NITROCHRYSENE	7496-02-8	52
NITROFURANTOIN	67-20-9	69
NITROGEN DIOXIDE		69
NITROGEN DIOXIDE	10102-44-0	114
NITROGLYCERIN	55-63-0	94
NITROPRUSSIDE	13755-38-9	66
NITROUS OXIDE	10024-97-2	53
NOREPINEPHRINE	51-41-2	94
NOREPINEPHRINE	51-41-2	87
OCHRATOXIN A	303-47-9	77
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN RADICALS		99
OXYGEN (SINGLET)		99
OZONE	10028-15-6	69
OZONE	10028-15-6	69
OZONE	10028-15-6	115
OZONE	10028-15-6	115
PARAOXON	311-45-5	53
PARAOXON	311-45-5	53
PARAQUAT	4685-14-7	69
PARAQUAT		72
PERCHLORETHYLENE	127-18-4	115
PEROXIDES		69
PERTUSSIS TOXIN		72
PHALLOIDIN(E)	17466-45-4	77
PHENOBARBITAL	50-06-6	77
PHENOBARBITAL	50-06-6	91
PHENOBARBITOL	50-06-6	115
PHENYLALKYLAMINES		83
PHENYLHYDRAZINES		77
PHORBOL ESTERS		82
PHOSPHOPROTEIN PHOSPHATASES		95
PHOSPHORAMIDE		69
ANTI-PLATELET DRUGS		95
CIS-PLATINUM	15663-27-1	77
POLYCYCLIC HYDROCARBONS		77
PROBENECID	57-66-9	84
N-PROPIONYL-N-HYDROXY-2-AMINOFLUORENE	52663-84-0	54
PROSTAGLANDIN E1	745-65-3	95
PSORALEN	66-97-7	45
PSORALENS		99
PUMILIOTOXIN		77
PYRIMIDINES		87
QUINEBIDIMYL BENZILATE		95
QUINIDINE	56-54-2	84
QUINOLINES		93
RESPIRATORY SYSTEM TOXINS		70
SACCHARIN	81-07-2	54
SACCHARIN	81-07-2	54
SAXITOXIN	35523-89-8	91
SCOPOLAMINE	51-34-3	96
SELENIUM	7782-49-2	45
SEROTONIN	50-67-9	96
SILICA	7631-86-9	70
SILICA	7631-86-9	70
STREPTOZOCIN	18883-66-4	84
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
SUCCINIMIDES		78
SULFANILAMIDE	63-74-1	82
SULFAPYRAZINE	116-44-9	96
SULFUR DIOXIDE	7446-09-5	116

BIOCHEMICAL/CELLULAR TISSUE EFFECT

CHEMICAL	CAS NO.	PAGE
SULFURIC ACID	7564-93-9	117
SUPEROXIDE ANION		100
SUPEROXIDE ANION		100
SUPEROXIDE ANION		100
TERATOGENIC AGENTS		84
TESTOSTERONE	58-22-0	55
TETRODOTOXIN	4368-28-9	90
THIOACETAMIDE	62-55-5	78
THIORIDAZINE		100
TOBACCO SMOKE		70
TOBACCO SMOKE		70
TOBRAMYCIN	32986-56-4	100
TOBRAMYCIN	32986-56-4	85
TOLUENE DIISUCYANATE	26471-62-5	70
TOXIN B (CLOSTRIDIUM)		78
TRICHLOROACETIC ACID	76-03-9	117
TRICHLOROACETONITRILE	545-06-2	117
TRICHLOROETHYLENE	79-01-6	117
TRIETHYLPHOSPHINE GOLD		82
TRIFLUOROTHYMIDINE		80
TRIMETHYL-PSORALEN	3902-71-4	45
VALPROIC ACID (DIPROPYLACETIC ACID)		78
VENOMS		85
VENOMS		94
VITAMIN E		45
VOMITOXIN	17924-92-4	45
ZEARALENONE	17924-92-4	45

CARCINOGENESIS

CHEMICAL	CAS NO.	PAGE
ACETALDOXIME	107-29-9	2
2-ACETAMIDOFLUORENE		106
ACETONE	67-64-1	33
ACETONITRILE	75-05-8	33
N-ACETOXY-AMINOFLUORENE		47
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	47
2-ACETYLAMINOFLUORENE	53-96-3	106
N-ACETYL-2-AMINOFLUORENE	53-96-3	47
N-ACETYLBENZIDINE	3366-61-8	47
ACID ORANGE NO. 3	6373-74-6	33
ACRYLONITRILE	107-13-1	11
ALLYL GLYCIDYL ETHER	106-92-3	33
9-AMINOACRIDINE HYDROCHLORIDE	134-50-9	33
4-AMINOBIPHENYL	92-67-1	106
4-AMINOBIPHENYL	92-67-1	106
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	33
2-AMINO-4-NITROPHENOL	99-57-0	33
2-AMINO-5-NITROPHENOL	121-88-0	33
2-(4-AMINOPHENYL)-6-METHYL-7BENZOTHIAZOLE	130-17-6	33
DL-AMPHETAMINE SULFATE	60-13-9	33
ANTIMONY POTASSIUM TARTRATE	28300-74-5	33
AROCHLOR 1254	11097-69-1	48
ARSENIC	7440-38-2	81
ARSENIC	7440-33-2	106
ASBESTOS	1332-21-4	106
ASPHALTIC BASED PAINTS		106
5-AZACYTIDINE	320-67-2	106
AZODICARBONAMIDE	123-77-3	33
AZOXYETHANE		2
AZOXYMETHANE		2
BARIUM	10361-37-2	106
BARIUM CHLORIDE DIHYDRATE	10326-27-9	33
BENZ(J)ACEANTHRYLENE		106
BENZ(C)ACRIDINE	225-51-4	74
BENZALDEHYDE	100-52-7	33
BENZANTHRACENE	56-55-3	74
BENZETHONIUM CHLORIDE	121-54-0	33
BENZOFURAN	271-89-6	33
BENZONITRILE	100-47-0	33
BENZO(A)PYRENE	50-32-8	48
BENZO(A)PYRENE	50-32-8	74
BENZO(A)PYRENE	50-32-8	74
BENZO(A)PYRENE	50-32-8	107
BENZOYL CHLORIDE	98-88-4	33
BENZYL ACETATE	140-11-4	33
BENZYL ALCOHOL	100-51-6	33
O-BENZYL-P-CHLOROPHENOL	120-32-1	33

CHEMICAL	CAS NO.	PAGE
2,2-BIS(BROMOMETHYL)-1,3-PROPANEDIOL	3296-90-0	33
BROMOBENZENE	108-86-1	33
BROMOBENZENE	108-86-1	33
2-BROMO-4,6-DINITROANILINE	1817-73-8	33
2-BROMO-4,6-DINITROANILINE	1817-73-8	33
BROMOFORM	75-25-2	33
1,3-BUTADIENE	106-99-0	33
2-BUTANONE PEROXIDE	1338-23-4	33
T-BUTYL ALCOHOL	75-65-0	33
BUTYL BENZYL PHTHALATE	85-68-7	33
TERT-BUTYL PERBENZOATE	614-45-9	33
BUTYRALDEHYDE	123-72-8	33
GAMMA-BUTYROLACTONE	96-48-0	33
CARBON TETRACHLORIDE	56-23-0	107
CARCINOGENS		74
CARCINOGENS		81
CARISOPRODOL	78-44-4	33
D-CARVONE	2244-16-8	33
CASTOR OIL	8001-79-4	34
CHLGRAMINE	10599-90-3	34
CHLORINATION BI-PRODUCTS		108
CHLORINE (CHLORINATED DRINKING ATER)	7990-92-3	108
CHLOROACETIC ACID	79-01-7	108
CHLOROACETOPHENONE	532-27-4	34
P-CHLOROANILINE	106-47-8	34
O-CHLOROBENZALMALONITRILE	2698-41-1	34
4-CHLORO-2-NITROANILINE	89-63-4	34
2-CHLOROPHENOL	95-57-8	109
CHLOROPRENE	126-99-8	34
2-CHLORO-1-PROPANOL + 1-CHLORO-2-PROPANOL		34
CHRYSOTILE	12000-29-5	58
CHRYSOTILE(MODIFIED)		58
CHRYSOTILE(MODIFIED)		58
C.I. ACID RED 114	6459-94-5	34
C.I. DIRECT BLUE 15	2429-74-5	34
C.I. DIRECT BLUE 218	28407-37-6	34
C.I. DIRECT YELLOW 11	1325-37-7	34
C.I. PIGMENT RED 3	2425-85-6	34
C.I. PIGMENT RED 23	6471-49-4	34
COAGULANTS, COAGULANT AIDS		109
COAL TAR		109
COBALT SULFATE HEPTAHYDRATE	10026-24-1	34
COCONUT OIL ACID (2 PARTS)-DIETHANOLAMINE	68603-42-9	34
CODEINE	76-57-3	34
CORN OIL	8001-30-7	11
CORN OIL	8001-30-7	11
CORN OIL	8001-30-7	11
CORN OIL	8001-30-7	34

STUDY TYPE INDEX

CARCINOGENESIS

CHEMICAL	CAS NO.	PAGE
COUMARIN	91-64-5	34
M-CRESOL	108-39-4	34
O-CRESOL	95-48-7	34
P-CRESOL	106-44-5	34
CRESOL (MIXED ISOMERS)	1319-77-3	34
CROCIDOLITE	12001-28-4	58
CROTONALDEHYDE	4170-30-3	34
CUPRIC SULFATE	7758-99-8	34
D AND C YELLOW NO. 11	8003-22-3	34
DEXAMETHASONE	50-02-2	49
2,4-DIAMINOPHENOL DIHYDROCHLORIDE	137-09-7	34
4,4'-DIAMINO-2,2'-STILBENEDISULFONIC ACID	81-11-8	34
2,3-DIBROMO-1-PROPANOL	96-13-9	34
DIBUTYL ADENOSINE		109
DIBUTYL PHTHALATE	84-74-2	34
DICHLOROACETIC ACID	79-43-6	109
5,6-DICHLORO-2-BENZOTHIAZOLAMINE	24072-75-1	34
1,2-DICHLOROETHANE	107-06-2	34
1,2-DICHLOROETHANE	107-06-2	34
2,4-DICHLOROPHENOL	120-83-2	34
DICHLORVOS	62-73-7	35
DIELDRIN	60-57-1	110
DIETHANOLAMINE	111-42-2	35
DIETHANOLAMINE	111-42-2	35
DIETHANOLAMINE	111-42-2	35
DIETHYLHEXYLPHTHALATE	117-81-7	110
DIETHYL PHTHALATE	84-66-2	35
DIETHYLTRIAZENE		2
3,4-DIHYDROCOUMARIN	119-84-6	35
1,2-DIHYDRO-2,2,4-TRIMETHYLQUINOLINE	147-47-7	35
DIMETHOXANE	828-00-2	35
3,3'-DIMETHOXYBENZIDINE	119-90-4	35
P-DIMETHYLAMINOAZOBENZENE	60-11-7	110
N,N-DIMETHYLANILINE	121-69-7	35
DIMETHYLBENZANTHRACENE	57-97-6	49
3,3'-DIMETHYLBENZIDINE	119-93-7	49
3,3'-DIMETHYLBENZIDINE	119-93-7	35
DIMETHYL PHTHALATE	131-11-3	35
DINITROPYRENE		49
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	35
DIPHENYLHYDANTOIN	57-41-0	49
DMBA/TPA/BPO (7,12-DIETHYLBENZ(A)ANTH	57-97-6	35
DRINKING WATER CONTAMINANTS		111
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES		105
EPINEPHRINE HYDROCHLORIDE	55-31-2	35
1,2-EPOXYHEXADECANE	7320-37-8	35
ERYTHROMYCIN STEARATE	643-22-1	35
ETHIDIUM BROMIDE		111
ETHYL BROMIDE	74-96-4	35
ETHYL CHLORIDE	75-00-3	35
ETHYLENE GLYCOL	107-21-1	35
ETHYLENE GLYCOL MONOETHYL ETHER	110-80-5	35
ETHYLENE THIOUREA	96-45-7	35
ETHYLNITROSOUREA	759-73-9	111
FERROCENE	102-54-5	35
6-FLUOROBENZO(A)PYRENE		75
FORMALDEHYDE	50-00-0	75
FORMIC ACID	64-18-6	35
FURAN	110-00-9	35
FURFURAL	98-01-1	35
FUROSEMIDE	54-31-9	35
GENTIAN VIOLET	548-62-9	50
GLUTARALDEHYDE	111-30-8	35
GLUTARALDEHYDE	111-30-8	35
GLYCIDOL	556-52-5	35
GLYCOL(POLYSORBATE 80)	9005-65-6	35
HALOACETONITRILES		111
HALOGENATED ACETONITRILES		111
HALOGENATED ETHANES		112
HC YELLOW 4	52551-67-4	35
HEXACHLOROCYCLOPENTADIENE	77-47-4	35
HEXACHLOROETHANE	67-72-1	35
N-HEXANE	110-54-3	36
1,6-HEXANEDIAMINE DIHYDROCHLORIDE	6055-52-3	36
1,6-HEXANEDIAMINE DIHYDROCHLORIDE	6055-52-3	36
HEXYLRESORCINOL	136-77-6	36
HUMIC ACID	1415-93-6	112
HYDROCHLOROTHIAZIDE	58-93-5	4
HYDROCHLOROTHIAZIDE	58-93-5	36
HYDROQUINONE	123-31-9	36
4-HYDROXYACETANILIDE	103-90-2	36
N-HYDROXY-N-ACETYL-2-AMINOFLUORENE		51
N-HYDROXY-N-ACETYLBENZIDINE	71609-25-1	51
N'-HYDROXY-N-ACETYLBENZIDINE	71609-23-9	51
N-HYDROXY-4-AMINOBIPHENYL	6810-26-0	51
N-HYDROXY-6-AMINOCHRYSENE		51
N-HYDROXY-AMINOFLUORENE	53-94-1	51
N-HYDROXY-N-FORMYL-2-AMINOFLUORENE		51
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	36
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	36
N-HYDROXY-1-NAPHTHYLAMINE	607-30-7	51
N-HYDROXY-1-NAPHTHYLAMINE	607-30-7	51
N-HYDROXY-2-NAPHTHYLAMINE	613-47-8	51
N-HYDROXY-2-NAPHTHYLAMINE	613-47-8	51
IODINATED GLYCEROL	5634-39-9	36

STUDY TYPE INDEX

CARCINOGENESIS

CHEMICAL	CAS NO.	PAGE
ISOBUTYL NITRITE	542-56-3	36
ISOBUTYRALDEHYDE	78-84-2	36
ISOPRENE	78-79-5	36
LAURIC ACID DIETHANOLAMINE	120-40-1	36
D-LIMONENE	5989-27-5	36
MALONALDEHYDE, SODIUM SALT	24382-04-5	36
MANGANESE SULFATE MONOHYDRATE	10034-96-5	36
2-MERCAPTOBENZIMIDAZOLE	583-39-1	36
2-MERCAPTOBENZOTHIAZOLE	149-30-4	36
MERCURIC CHLORIDE	7487-94-7	36
METHAPYRILENE		4
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-10-0	36
8-METHOXYPSORALEN	298-81-7	36
N-METHYL-4-AMINOAZOBENZENE	621-90-9	52
7-METHYLBENZO(A)PYRENE	63041-77-0	52
4-(6-METHYL-2-BENZOTHIAZOLYL)BENZENAMINE	92-36-4	36
ALPHA-METHYLBENZYL ALCOHOL	98-85-1	36
METHYL BROMIDE	74-83-9	36
3-METHYLCHOLANTHENE	56-49-5	113
METHYLCHOLANTHRENE	56-49-5	76
METHYLDOPA	555-30-6	36
METHYLEUGENOL	93-15-2	36
METHYL METHACRYLATE	80-62-6	113
METHYL METHANESULFONATE	66-27-2	113
METHYL METHANESULFONATE	66-27-3	52
3-METHYL-6-METHOXY-2-AMINO-BENZOTHIAZOLIDINE	NOCAS0884	36
N-METHYL-N-NITROSOGUANIDINE	70-25-7	113
N-METHYL-N-NITROSOUREA	684-93-5	52
N-METHYLOLACRYLAMIDE	924-42-5	36
METHYLPHENIDATE HC1	298-59-9	36
MIREX	2385-85-5	36
MOLYBDENUM TRIOXIDE	1313-27-5	36
MONOCHLOROACETIC ACID	79-11-8	36
NALIDIXIC ACID	389-08-2	36
NAPHTHALENE	91-20-3	36
2-NAPHTHYLAMINE	91-59-8	52
BETA-NAPHTHYLAMINE	91-59-8	114
NICKEL CARBONATE		114
NICKEL DUST		114
NICKEL HYDROXIDE		114
NICKEL OXIDE	1313-99-1	37
NICKEL SUBSULFIDE	12035-77-3	37
NICKEL SULFATE		114
NICKEL SULFATE HEXAHYDRATE	10101-97-0	37
NITRITE	14797-65-0	4
P-NITROANILINE	100-01-6	37
O-NITROANISOLE	91-23-6	37
M-NITROBENZOIC ACID	121-92-6	37
P-NITROBENZOIC ACID	62-23-7	37
6-NITROBENZO(A)PYRENE	63041-90-7	52
4-NITROBIPHENYL	92-93-3	52
3-NITROFLUORANTHENE		114
2-NITROFLUORENE	607-57-8	52
NITROFURANTOIN	67-20-9	37
NITROFURAZONE	59-87-0	37
NITROMETHANE	75-52-5	37
1-NITRONAPHTHALENE	86-57-7	52
P-NITROPHENOL	100-02-7	37
4-NITROQUINONE		114
4'-NITROSO-N-ACETYL-4-AMINOBIPHENYL		53
NITROSO-ALLYLUREA		2
NITROSO-N-AMYLUREA		2
4-NITROSOBIPHENYL	10125-76-5	53
NITROSOBIS-(2-HYDROXYPROPYL)-A-MINE		2
NITROSO-BIS-(2-OXOPROPYL)-AMINE		2
NITROSO-BIS-(2-OXOPROPYL)-AMINE	60599-38-4	2
NITROSO-BIS-(2-OXOPROPYL)AMINE-D4		2
NITROSO-N-BUTYLUREA		2
1-NITROSO-1-(2-CHLOROETHYL)-3-(2-HYDROXYPROPYL)-UREA		2
NITROSODIETHANOLAMINE		2
NITROSODIETHANOLAMINE	1116-54-7	2
NITROSODIETHYLAMINE		2
NITROSO-DIETHYLUREA		2
NITROSO-DIETHYLUREA		9
NITROSODIMETHYLAMINE	62-75-9	2
NITROSODIMETHYLAMINE	62-75-9	2
NITROSO-DIMETHYLUREA		2
NITROSO-DIMETHYLUREA		9
1-NITROSO-1-ETHYL-3-(2-HYDROXYETHYL-UREA)		2
1-NITROSO-1-ETHYL-3-METHYLUREA		2
NITROSO-1-ETHYL-3-(2-OXOPROPYL)UREA		2
NITROSOETHYLUREA		2
NITROSO-2-FLUOROETHYLUREA		2
NITROSO-N-HEXYLUREA		2
1-NITROSO-1-(2-HYDROXYETHYL)-3(2-CHLOROETHYL)UREA		2
1-NITROSO-1-(2-HYDROXYETHYL)3-ETHYLUREA		2
NITROSOHYDROXYETHYLUREA	13743-07-2	2
NITROSOHYDROXYETHYLUREA	13743-07-2	9
NITROSO-2-HYDROXY-MORPHOLINE		2
1-NITROSO-1-(2-HYDROXYPROPYL)-3(2-CHLOROETHYL)UREA		3
NITROSOHYDROXYPROPYLOXOPROPYLAMINE	61499-28-3	3
NITROSO-(2-HYDROXYPROPYL) (2-OXOPROPYL)AMINE		3
NITROSO-3-HYDROXYPROPYLUREA		3
NITROSO-2-METHOXETHYLUREA		3
NITROSOMETHYL-N-AMYLAMINE		9
NITROSO-N-METHYLANILINE	614-00-6	3

STUDY TYPE INDEX

CARCINOGENESIS

CHEMICAL	CAS NO.	PAGE
NITROSOMETHYL-N-BUTYLAMINE		9
NITROSOMETHYL-3-CARBOXYPROPYLAMINE		3
NITROSOMETHYL-CYCLOHEXYLAMINE		9
NITROSOMETHYLCYCLOHEXYLAMINE	5432-28-0	3
NITROSOMETHYLETHYLAMINE	10595-95-6	3
1-NITROSO-1-METHYL-3-ETHYLUREA		3
NITROSOMETHYL-N-HEPTYLAMINE		9
NITROSOMETHYL-N-HEXYLAMINE	28538-70-7	9
NITROSOMETHYL-2-HYDROXYPROPYLAMINE		3
NITROSOMETHYL-N-OCTYLAMINE		9
NITROSOMETHYL-N-OCTYLAMINE	34423-54-6	3
NITROSOMETHYL-2-OXOPROPYLAMINE		3
NITROSOMETHYL-N-PROPYLAMINE		9
NITROSOMETHYLUREA	684-93-5	3
NITROSOMETHYLUREA		9
NITROSOMORPHOLINE		3
1-NITROSONAPHTHALENE	21711-65-9	53
NITROSO-1-(2-OXOPROPYL)-3ETHYLUREA		9
NITROSO-1-(2-OXOPROPYL)3-ETHYLUREA		3
NITROSO-2-OXOPROPYLUREA		3
NITROSO-2-OXOPROPYLUREA		9
NITROSO-2-PHENYLETHYLUREA		3
NITROSO-2-PHENYLETHYLUREA		9
NITROSOTHIALDINE		3
NITROSOTHIAZOLIDINE		3
P-NITROTOLUENE	99-99-0	37
OCHRATOXIN A	303-47-9	37
OLEIC ACID DIETHANOLAMINE SALT	13961-86-9	37
ORGANIC CHLORAMINES		114
1,2-OXATHIOLATE-2,-2-DIOXIDE	1120-71-4	114
PENICILLIN V POTASSIUM	132-98-9	37
PENTACHLOROANISOLE	1825-21-4	37
PENTACHLOROBENZENE	608-93-5	37
PENTACHLOROPHENOL, DOWICIDE EC-7	87-86-5	37
PENTACHLOROPHENOL, TECHNICAL	87-86-5	37
PENTAERYTHRITOL TETRANITRATE	78-11-5	37
PHENOLPHTHALEIN	77-09-8	37
PHENYLBUTAZONE	50-33-9	37
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	37
PHENYTOIN	57-41-0	37
PHORBOL		115
POLYBROMINATED BIPHENYL (FF-I)	36355-01-8	37
POLYCYCLIC HYDROCARBONS		77
PRIORITY AIR POLLUTANTS		116
PROBENECID	57-66-9	37
PROMETHAZINE HYDROCHLORIDE	58-33-3	37
BETA-PROPIOLACTONE	57-57-8	116
PSORALEN	66-97-7	82
PYRIDINE	110-86-1	37
QUERCETIN	117-39-5	37
QUINOLINES		11
RESORCINOL	108-46-3	37
RETINOIC ACID	302-79-4	116
RHODAMINE 6G	989-38-8	37
RICIN	9009-86-3	77
RIDDELLINE	23246-96-0	37
ROXARSONE	121-19-7	37
SAFFLOWER OIL	8001-23-8	37
SALICYLAZOSULFAPYRIDINE	599-79-1	37
SCOPOLAMINE HYDROBROMIDE	51-34-3	37
SILVER	7440-22-4	116
SODIUM AZIDE	26628-22-8	37
SODIUM CYANIDE	143-33-9	37
SODIUM DODECYL SULFATE	151-21-3	38
SODIUM FLUORIDE	7681-49-4	38
SODIUM NITRITE	7632-00-0	5
SODIUM SELENATE	13410-01-0	38
SODIUM SELENITE	10102-18-8	38
SODIUM THIOCYANATE	540-72-7	5
SODIUM XYLENE SULFONATE	1300-72-7	38
SODIUM XYLENESULFONATE	1300-72-7	38
SUCCINIC ANHYDRIDE	108-30-5	38
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
TALC	14807-96-6	38
1,2,4,5-TETRACHLOROBENZENE	95-94-3	38
TETRACHLOROETHYLENE	127-18-4	38
TETRACHLOROETHYLENE	127-18-4	117
TETRACHLOROPHTHALIC ANHYDRIDE	117-08-8	38
TETRACYCLINE HYDROCHLORIDE	64-75-5	38
TETRAFLUOROETHYLENE	116-14-3	38
1-TRANS-DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	38
TETRAHYDROFURAN	109-99-9	38
TETRANITROMETHANE	509-14-8	38
THEOPHYLLINE	58-55-9	38
4,4'-THIOBIS(6-TERT-BUTYL-MCRESOL)	96-69-5	38
THIOPHENE	110-02-1	38
TITANIUM FERROCENE	1271-19-8	38
TOLUENE	108-88-3	38
O-TOLUIDINE	95-53-4	117
TPA	41479-14-5	35
TRIAMTERENE	396-01-0	38
TRICAPRYLIN	538-23-8	38
TRICHLORFON	52-68-6	38
TRICHLOROACETIC ACID	76-03-9	117
1,1,1-TRICHLOROETHANE	71-55-6	38

STUDY TYPE INDEX

CARCINOGENESIS

CHEMICAL	CAS NO.	PAGE
TRICHLOROETHYLENE	79-01-6	117
1,2,3-TRICHLOROPROPANE	96-18-4	38
TRICRESYL PHOSPHATE	1330-78-5	38
TRIETHANOLAMINE	102-71-6	38
TRIETHANOLAMINE	102-71-6	38
TRIETHANOLAMINE	102-71-6	38
TRIPROLIDINE HCL	6138-79-0	55
TRIS(2-CHLOROETHYL) PHOSPHATE	115-96-8	38
TUMERIC (CURCUMIN)	8024-37-1	38
VINYL CYCLOHEXENE DIOXIDE	106-87-6	38
VINYL TOLUENE	25013-15-4	38
WOLLASTONITE CALCIUM SILICATE	13983-17-0	38

CHRONIC TOXICITY

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	97
ACROLEIN	107-02-8	68
ADENINE NUCLEOTIDES		85
ADRIAMYCIN	23214-92-8	66
ADRIAMYCIN	23214-92-8	97
ALCOHOL, CAFFEINE, DRUGS		59
ALIPHATIC NITRILES		66
ALLETHRIN	584-79-2	85
AMINOPYRIDINES		85
ANTHOPLEURIN-A	60880-63-9	85
ANTHRACYCLINE ADRIAMYCIN	23214-92-8	66
ANTISICKLING AGENTS		71
APOMORPHINE	58-00-4	86
ARSENIC	7440-38-2	81
BIS-(THIOACETOXYL)AURATE(I)		86
BETA-BUNGAROTOXIN	12778-32-4	86
CARCINOGENS		81
1,8-CINEOLE	470-82-6	48
1,8-CINEOLE	470-82-6	48
CINNAMALDEHYDE	104-55-2	48
CLOMIPHENE CITRATE		59
CYANIDE		66
CYCLIC AMP	60-92-4	88
CYCLOPHOSPHAMIDE (TOXIC METABOLITES)	50-18-0	68
DDT	50-29-3	88
DEMETON	8065-48-3	88
DIAZACHOLESTEROL	313-05-3	88
DIETHYLSTILBESTROL	56-53-1	49
5,6-DIHYDROXYTRYPTAMINE	5090-36-8	88
DOPA	59-92-7	89
ESTRADIOL	50-28-2	50
GENTAMICIN	1403-66-3	98
GOLD SODIUM THIOMALATE	39377-38-3	81
GRAYANOTOXIN	1399-60-6	89
6-HYDROXYDOPAMINE	1199-18-4	89
LHRH ANALOGUES		59
LITHIUM		103
LITHIUM	7439-93-2	103
METHOTREXATE	59-05-2	82
METHYL DEMETON	8022-00-2	90
METHYL ISOCYANATE	624-83-9	13
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103
NEUROLEPTICS		103

CHEMICAL	CAS NO.	PAGE
NITRILES		66
NITROGEN DIOXIDE	10102-44-0	114
NITROGEN DIOXIDE	10102-44-0	114
NITROPRUSSIDE	13755-38-9	66
NITROPRUSSIDE	15078-28-1	66
OCHRATOXIN A	303-47-9	77
ORAL CONTRACEPTIVES		61
ORAL CONTRACEPTIVES		61
OUABAIN	630-60-4	66
OZONE	10028-15-6	115
OZONE	10028-15-6	115
PALYTOXIN	11077-03-5	95
PARACHLOROPHENYLALANINE	1991-78-2	95
PHENYLALKYL AMINES		67
PHOSPHORAMIDE		69
PSORALEN	66-97-7	82
PYRILAMINE MALEATE	91-84-9	54
QUININE, QUINIDINE	56-54-2	71
RADIOGRAPHIC CONTRAST MATERIAL		67
RAUWOLFIA ALKALOIDS		95
RESERPINE	50-55-5	96
RETINOIDS		64
RITODRINE		63
RITODRINE		63
SALICYLATES		95
SALICYLAZOSULFAPYRIDINE (SULFASALAZINE)	599-79-1	82
SAXITOXIN	35523-89-8	96
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
SULFAMETHAZINE	57-68-1	54
SULFUR DIOXIDE	7446-09-5	116
SYNTHETIC PYRETHROIDS		96
TAMOXIFEN		59
TETANUS TOXIN		86
TETANUS TOXIN		96
DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	104
TETRODOTOXIN	4368-28-9	67
TETRODOTOXIN	4368-28-9	96
TOBACCO SMOKE COMPONENTS		67
TOBRAMYCIN	32986-56-4	100
VALPROIC ACID	99-66-1	63
VERAPAMIL	52-53-9	67
VERATRIDINE	71-62-5	96

CLINICAL TOXICOLOGY/EPIDEMIOLOGY

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	81
ACRYLAMIDE	79-06-1	73
ACYCLOUIR+DERIVATIVES	59277-89-3	79
ACYCLOVIR	59277-89-3	79
ACYCLOVIR	59277-89-3	79
ADENINE ARABINOSIDE (ARA-A)	5536-17-4	79
ADENINE ARABINOSIDE (ARA-A)	5536-17-4	79
AEROSOLS		68
AFLATOXIN	1402-68-2	44
ALUMINUM	7429-90-5	81
ALUMINUM COMPOUNDS NEUROTOXINS		85
ANESTHETICS, LOCAL		87
ANSIOMYCIN		79
ANSIOMYCIN		79
ANSIOMYCIN		79
ANSIOMYCIN		79
ANTICONVULSANTS		92
ANTICONVULSANTS		91
ANTICONVULSANTS		91
ANTISICKLING AGENTS		71
ASBESTOS	1332-21-4	68
AZATHIOPRINE	446-86-6	81
AZIDOTHYMIDINE		79
BACTERIAL ENDOTOXINS METALS, HEAVY METALS, COPPER (COMPOUNDS)		86
BUNGAROTOXIN		87
BUNGAROTOXIN		87
CARBON TETRACHLORIDE	56-23-0	107
CARBOXYLIC ACIDS NEUROPHARMACOLOGICAL AGENTS ANTICONVULSANTS		87
CATECHOLAMINES		86
CHLORAMINE	10599-90-3	108
CHLORINE (CHLORINATED DRINKING ATER)	7990-92-3	108
CHLORINE GAS	7782-50-5	68
CHLOROPICRIN	76-06-2	109
CLONIDINE		62
COFFEE DUST		68
COTTON DUST		68
CYCLOPHOSPHAMIDE	50-18-0	81
CYCLOSPORINE		97
CYCLOSPORINE		97
DEBRISOQUINE		62
DEOXYGLUCOSE		88
DHPG		79
DHPG		79
DHPG		79
DICHLORODIPHENYLETHYLENE	72-55-9	12
DIDEOXYCYTIDINE		79

CHEMICAL	CAS NO.	PAGE
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIDEOXYCYTIDINE		79
DIHYDROXY PROPYL GUANOSINE		98
DIURETICS		85
DOPAMINE, NEUROTOXINS		92
ENFLUREANE	13838-16-9	75
ENVIRONMENTAL AGENTS		59
FENFLURAMINE		62
FLUBOPROFEN		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
5-FLUOROURACIL		98
FMAU		79
FMAU		79
FOLATE		62
FOSCARNET		80
FOSCARNET		80
FOSCARNET		80
FOSCARNET		80
FUROSEMIDE	54-31-9	75
FUROSEMIDE		96
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD SODIUM THIOMALATE	39377-38-3	81
GOLD SODIUM THIOMALATE	39377-38-3	81
GONADATROPIC RELEASING HORMONE ANALOGS		59
GRAYANOTOXINS, SAXITOXIN		94
HYDROXYCHLOROQUINE	118-42-3	82
BETA-INTERFERON		80
INTERFERON	9008-11-1	99
GAMMA-INTERFERON		80
INTERFERON		80
GAMMA-INTERFERON		80
IRON CHELATES		76
S-26308 (1-ISOBUTYL-1-H IMIDAZO[4,5-C] QUINOLIN-4-AMINE)		80
KAOLIN	1332-58-7	69
LEAD	7459-92-1	62
LEAD	7439-92-1	62
LEAD	7439-92-1	112
LHRH ANALOGS		65
MERCURIC CHLORIDE	7487-94-7	12
METHOTREXATE	59-05-2	82

0320

STUDY TYPE INDEX

CLINICAL TOXICOLOGY/EPIDEMIOLOGY

CHEMICAL	CAS NO.	PAGE
METHOTREXATE	59-05-2	82
METHYLPHENIDATE	113-45-1	62
MONOGLUTAMIC FOLATE		61
MUTAGENIC AGENTS		76
NALOXONE	465-65-6	90
NEUROTOXINS		85
NEUROTOXINS		89
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		92
NEUROTOXINS		94
NICOTINE	54-11-5	63
NICOTINE		94
OIL SHALE PRODUCTS		105
ORAL CONTRACEPTIVES		61
ORAL CONTRACEPTIVES		61
PBB'S		45
PCB'S		13
PENICILLAMINE	52-67-5	82
PHENYLALKYL AMINES		67
PHORBOL ESTERS		82
PHOSPHENE		115
CIS-PLATINUM	15663-27-1	77
POLYCHLORINATED BIPHENYLS		14
POLYCHLORINATED BIPHENYLS		14
POLYCHLORINATED BIPHENYLS		15
POLYCHLORINATED BIPHENYLS		15
PROCAINAMIDE	51-06-9	82
PYRIDINES		94
PYRIMIDINES		92
QUININE, QUINIDINE	56-54-2	71
QUINOLINES		94
TRANS-RETINOIC ACID	302-79-4	82
RIBAVIRIN		80
RIBAVIRIN		80
RICIN	9009-86-3	77
RIMANTIDINE		80
RIMANTIDINE		80
SALICYLAZOSULFAPYRIDINE (SULFASALAZINE)	599-79-1	82
SILICA	7631-86-9	70
SODIUM BENZOATE		62
SODIUM FLUORIDE	7681-49-4	101
SORBINIL		99
STREPTOZOTOCIN	18883-66-4	77
SULFUR DIOXIDE	7446-09-5	116
SUPROFEN		100
TETRODOTOXIN	4368-28-9	67
TETRODOTOXIN		87
TETRODOTOXIN		91
TOLUENE DIISOCYANATE	26471-62-5	70
TOXALBUMINS (PLANT)		94
TRIETHYLPHOSPHINE GOLD		82
VENOMS		96
VERAPAMIL	52-53-9	67
VITAMIN A	68-26-8	82

DERMAL TOXICITY

CHEMICAL	CAS NO.	PAGE	CHEMICAL	CAS NO.	PAGE
ACETOETHYLTETRAMETHYLTETRALIN		44			
N-NITROSO-N-METHYLDODECYLAMINE	75356-79-5	44			
N-NITROSO-N-METHYLOCTADECYLAMINE		45			

IMMUNOLOGIC TOXICITY

CHEMICAL	CAS NO.	PAGE
N-ACETOXY-N-TRIFLUOROACETYL-4-AMINOBIPHENYL		47
ACROLEIN	107-02-8	106
AEROSOLS		68
4-AMINOBIPHENYL	92-67-1	47
AMMONIUM SULFATE	7783-20-2	106
ASBESTOS	1332-21-4	68
BACTERIAL ENDOTOXIN		73
BENZIDINE	92-87-3	12
CADMIUM CHLORIDE	10108-64-2	107
CAFFEINE	58-08-2	44
CHLORINE GAS	7782-50-5	68
CHLOROFORM	67-66-3	108
5-CHLOROURACIL		109
CHOLERA TOXIN		74
COFFEE DUST		68
COPPER		44
COTTON DUST		68
CYCLOPHOSPHAMIDE	50-18-0	109
CYCLOSPORIN A	59865-13-3	109
2'-DEOXYCOFORMYCIN		109
DICHLOROACETIC ACID	79-43-6	109
DICHLORODIPHENYLETHYLENE	72-55-9	12
DIFLUOROMETHYL ORNITHINE		110
DINOCAP		110
DI-N-OCTYLTIN DICHLORIDE		110
DIPHENYLHYDANTOIN	57-41-0	49
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
ETHYL BENZENE	100-41-4	111
ETHYLENE OXIDE	75-21-8	111
5-FLUOROURACIL	51-21-8	111
GALLIUM ARSENIDE	1303-00-0	14
GLYCOL ETHERS		12
GOLD	7440-57-5	81
GOLD	7440-57-5	81
GOLD SODIUM THIOMALATE	39377-38-3	56
GOLDTHIOMALATE	39377-38-3	56
HEAT STABLE TOXIN OF E. COLI		44
HEXAMETHYLENE DIAMINE - 2HCl		112
HYDRALAZINE	86-54-4	56
INTERFERON	9008-11-1	83
KAOLIN	1332-58-7	69
KARATHANE		112
LINDANE	58-89-9	51
LINDANE	58-89-9	51
MANGANESE CHLORIDE		112
MEMBRANE ATTACK COMPLEX		76
MERCURIC CHLORIDE	7487-94-7	12
MERCURIC CHLORIDE	7487-94-7	56
MERCURIC CHLORIDE	7487-94-7	56
METHYLDOPA	555-30-6	56
METHYLDOPA	555-30-6	56
METHYLENE CHLORIDE	75-09-2	113
METHYL ISOCYANATE	624-83-9	13
METHYL XANTHINES		44
MYCOTOXINS		11
NEPHROTOXINS		76
NEUROTOXINS		93
NICKEL	7440-02-0	114
NICKEL CHLORIDE		114
NICKEL SULFATE		13
NITROFEN ANALOGS		114
NITROFURANTOIN	67-20-9	56
NITROGEN DIOXIDE	10102-44-0	114
NITROGEN DIOXIDE	10102-44-0	114
NITROTOLUENES		14
ORAL CONTRACEPTIVES		61
OZONE	10028-15-6	115
OZONE	10028-15-6	115
OZONE	10028-15-6	115
PARTICULATES		115
PENICILLAMINE	52-67-5	82
D-PENICILLAMINE	52-67-5	57
POLYCHLORINATED BIPHENYLS		15
PRACTOLOL	6673-35-4	57
PROCAINAMIDE	51-06-9	57
PROCAINAMIDE	51-06-9	57
PROCAINAMIDE	51-06-9	82
PROPRANOLOL	525-66-6	57
PYRILAMINE	91-84-9	54
SILICA	7631-86-9	70
STAPHYLOCOCCAL ENTEROTOXINS		45
SULFUR DIOXIDE	7446-09-5	116
SULFUR DIOXIDE	7446-09-5	116
SULFURIC ACID	7664-93-9	117
TENUAZONIC ACID		45
2,3,7,8-TETRACHLORO-DIBENZO-P-DIOXIN	1746-01-6	13
TITANOCENE DICHLORIDE	1271-19-8	13
TOLUENE DIISOCYANATE	26471-62-5	70
TRICHLOROACETIC ACID	76-03-9	117

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
ACENAPHTHENE	83-32-9	16
ACETALDEHYDE	75-07-0	24
ACETAMINOPHEN	103-90-2	39
ACETAMINOPHEN	103-90-2	24
ACETIC ACID	64-19-7	16
ACETIC ACID	64-19-7	39
ACETOHEXAMIDE	968-81-0	39
ACETOHEXAMIDE	968-81-0	16
ACETONE	67-64-1	24
N-ACETOXY-N-ACETYL-1-AMINOPYRENE		47
N-ACETOXY-AMINOFLUORENE		47
2-ACETYLAMINOFLUORENE	53-96-3	47
4-ACETYLAMINOFLUORENE	28322-02-3	39
2-ACETYLAMINO-4-METHYLPHENOL	6375-17-3	16
N-ACETYL-1-AMINOPYRENE		47
N-ACETYL-N-HYDROXY-1-AMINOPYRENE		47
4-ACETYL PYRIDINE	1122-54-9	16
4-ACETYL PYRIDINE	1122-54-9	24
N4-ACETYLSULFAMETHAZINE	100-90-3	47
N-ACETYL-P-TOLUIDINE	103-89-9	16
ACRYLAMIDE	79-06-1	24
ACRYLAMIDE	79-06-1	30
ACRYLAMIDE	79-06-1	106
AGARITINE	2757-90-6	16
ALCOHOL		97
ALDRIN	309-00-2	16
ALKYLATING AGENTS		105
ALLYL GLYCIDYL ETHER	106-92-3	39
ALLYL UREA	557-11-9	39
AMILORIDE HCL	2016-88-8	16
9-AMINOACRIDINE		106
2-AMINOBENZENESULFONIC ACID	88-21-1	16
2-AMINO-4-CHLORO-6-NITROPHENOL	6358-08-3	16
2-AMINO-4-CHLOROPHENOL	95-85-2	16
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	24
1-AMINO-2,4-DIBROMOANTHRAQUINONE	81-49-2	39
2-AMINO-4,6-DICHLOROPHENOL	527-62-8	16
3-AMINO-4-ETHOXYACETANILIDE	17026-81-2	24
3-AMINO-9-ETHYLCARBAZOLE	6109-97-3	24
1-AMINO-2-METHYLANTHRAQUINONE	82-28-0	106
1-AMINO-2-METHYLANTHRAQUINONE	82-28-0	24
3-AMINO-4-METHYLPHENOL	2836-00-2	16
2-AMINO-3-NITRO-4-METHYLPHENOL	6265-05-0	16
2-AMINO-5-NITRO-4-METHYLPHENOL	6265-06-1	16
4-AMINO-2-NITROPHENOL	119-34-6	24
2-AMINO-6-NITRO-1-PHENOL-4-SULFONIC	96-93-5	16
2-AMINO-5-NITROTHIAZOLE	121-66-4	24
1-AMINOPYRENE	1606-67-3	48
(3H)-1-AMINOPYRENE		48
3-AMINO-5-SULFOSALICYLIC ACID	6201-86-1	16
2-AMINO-4-THIAZOLEACETIC ACID	29676-71-9	16
3-AMINOTRIAZOLE	61-82-5	39
2-AMINO-3,4,6-TRICHLOROPHENOL	6358-15-2	16
AMPHETAMINE SULFATE	60-13-9	24
AMPHETAMINE SULFATE	60-13-9	30
AMPHETAMINE SULFATE	60-13-9	39
AMPHOTERICIN B	1397-89-3	24
AMPHOTERICIN B	1397-89-3	16
P-ANISIDINE HYDROCHLORIDE	20265-97-8	39
2-ANTHRAMINE		106
ANTIMONY POTASSIUM TARTRATE	28300-74-5	16
AROCHLOR		106
AROCLOR 1254	11097-69-1	24
AROMATIC AMINES		105
AROMATIC HYDROCARBONS		11
AROMATIC HYDROCARBONS		11
AROMATIC HYDROCARBONS		11
ASBESTOS	1332-21-4	106
L-ASCORBIC ACID	50-81-7	30
ASPHALTIC BASED PAINTS		106
5-AZACYTIDINE	320-67-2	106
5-AZACYTIDINE	320-67-2	16
5-AZA-2'-DEOXYCYTIDINE	2353-33-5	39
8-AZAGUANINE		106
AZATHIOPRINE	446-86-6	16
AZINPHOSMETHYL	86-50-0	24
AZIRIDINYLBENZOQUINONE		106
AZOCYTOSINEARABINOSIDE		8
AZOCYTOSINEARABINOSIDE		6
AZODICARBONAMIDE	123-77-3	24
AZOXYMETHANE	25843-45-2	16
BARIUM CHLORIDE DIHYDRATE	10326-27-9	16
BARIUM LITHOL	1103-38-4	6
BARIUM LITHOL	1103-38-4	8
BENZ(C)ACRIDINE	225-51-4	74
BENZANTHRACENE	56-55-3	48
BENZANTHRACENE	56-55-3	74
BENZ(A)ANTHRACENE	56-55-3	107
BENZENE	71-43-2	107
BENZENE	71-43-2	30
BENZIDINE	92-87-5	107
BENZIDINE	92-87-5	30
BENZO(B)FLUORANTHENE	205-99-2	16
BENZO(K)FLUORANTHENE	207-08-9	16
BENZOIN	119-53-9	30
BENZONITRILE	100-47-0	24

STUDY TYPE INDEX

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
BENZO(A)PYRENE	50-32-8	24
BENZO(A)PYRENE	50-32-8	48
BENZO(A)PYRENE	50-32-8	74
BENZO(A)PYRENE	50-32-8	107
1,2,3-BENZOTRIAZOLE	95-14-7	16
BENZOYL CHLORIDE	98-88-4	16
BENZYL ACETATE	140-11-4	107
BENZYL CHLORIDE	100-44-7	24
O-BENZYL-P-CHLOROPHENOL	120-32-1	39
BENZYL SULFIDE	538-74-9	16
BERYLLIUM SULFATE TETRAHYDRATE	7787-56-6	16
BISBENZIMIDE		107
N,N'-BIS(1,4-DIMETHYLPENTYL)P-PHENYLENEDIAMINE	3081-14-9	24
BISPHENOL A	80-05-7	30
BISPHENOL A DIGLYCIDYL ETHER	1675-54-3	24
(4,4'-BITHIAZOLE)-2,2'-DIAMINE	58139-59-6	16
BROMOBENZENE	106-86-1	39
5-BROMO-2-DEOXYURIDINE		107
BETA-BROMO-BETA-NITROSTYRENE	7166-19-0	16
BROMOPICRIN	464-10-8	16
1,3-BUTADIENE	106-99-0	16
1,3-BUTADIENE	106-99-0	24
1,3-BUTADIENE	106-99-0	30
1,3-BUTADIENE	106-99-0	39
BUTANAL OXIME	110-69-0	6
N-BUTANE	106-97-8	16
N-BUTANE	106-97-8	24
N-BUTANE	106-97-8	30
2-BUTANONE, OXIME	96-29-7	6
4-BUTOXYBENZYL-4-ETHYLANILINE	29743-15-5	17
2-BUTOXYETHANOL	111-76-2	24
2-(2-BUTOXYETHOXY)ETHYLTHIOCYANATE	112-56-1	39
N-BUTYL ACRYLATE	141-32-2	24
N-BUTYL ACRYLATE	141-32-2	30
T-BUTYLHYDROQUINONE	1948-33-0	24
T-BUTYLHYDROQUINONE	1948-33-0	17
BUTYRIC ACID	107-92-6	17
BUTYRIC ACID	107-92-6	39
N-BUTYRIC ACID, METHYL ESTER	623-42-7	39
GAMMA-BUTYROLACTONE	96-48-0	39
BUTYRYL CHLORIDE	141-75-3	17
CAFFEINE	58-08-2	64
CALCIUM CHROMATE	13765-19-0	39
CALCIUM CHROMATE	13765-19-0	107
CALCIUM CYANAMIDE	156-62-7	39
CAPROIC ACID	142-62-1	39
CAPROLACTAM	105-60-2	30
CAPTAN		107

CHEMICAL	CAS NO.	PAGE
CAPTAN	133-06-2	24
CARBARSONE	121-59-5	17
CARBENDAZIM	10605-21-7	24
CARBON DISULFIDE	75-15-0	24
CARBON TETRACHLORIDE	56-23-5	24
CARBON TETRACHLORIDE	56-23-5	30
CARBON TETRACHLORIDE	56-23-0	107
CARBROMAL	77-65-6	39
CARISOPRODOL	78-44-4	24
CARMINIC ACID	1260-17-9	17
D-CARVONE	2244-16-8	39
D-CARVONE	2244-16-8	24
CASTOR OIL	8001-79-4	24
CHEMICAL PROMUTAGENS		11
CHLORDANE	57-74-9	108
CHLORDANE	12789-03-6	24
CHLORDECONE (KEPONE)	143-50-0	39
CHLORENDIC ACID	115-28-6	24
CHLORINATED PARAFFINS: C12, 60% CHLORINE	63449-39-8	25
CHLORINE (CHLORINATED DRINKING ATER)	7990-92-3	108
CHLOROACETOPHENONE (CN)	532-27-4	25
CHLOROACETOPHENONE (CN)	532-27-4	39
4-(CHLOROACETYL)ACETANILIDE	140-49-8	17
4-(CHLOROACETYL)ACETANILIDE	140-49-8	39
N-(3-CHLOROALLYL)HEXAMINIUM CHLORIDE	4080-31-3	17
O-CHLOROANILINE	95-51-2	39
M-CHLOROANILINE	108-42-9	39
P-CHLOROANILINE	106-47-8	39
2-CHLOROBENZALDEHYDE	89-98-5	17
4-CHLOROBENZALDEHYDE	104-88-1	17
CHLOROBENZILATE	510-15-6	39
O-CHLOROBENZOIC ACID	118-91-2	17
M-CHLOROBENZOIC ACID	535-80-8	17
P-CHLOROBENZOIC ACID	74-11-3	17
4-CHLORO-O-CRESOL	1570-64-5	17
4-CHLORO-M-CRESOL	59-50-7	17
2-CHLOROETHYLTRIMETHYLAMMONIUM CHLORIDE	999-81-5	39
3-CHLORO-2-METHYLPROPENE	563-47-3	30
2-CHLOROMETHYLPYRIDINE HYDROCHLORIDE	6959-47-3	39
3-CHLOROMETHYLPYRIDINE HYDROCHLORIDE	6959-48-4	40
1-CHLORONAPTHALENE	90-13-1	17
2-CHLORONAPTHALENE	91-58-7	17
2-CHLORO-2-NITROPROPANE	594-71-8	17
4-CHLORO-O-PHENYLENEDIAMINE	95-83-0	30
4-CHLORO-M-PHENYLENEDIAMINE	5131-60-2	30
2-CHLORO-P-PHENYLENEDIAMINE SULFATE	61702-44-1	30
2-CHLORO-P-PHENYLENEDIAMINE SULFATE	61702-44-1	40
CHLOROPICRIN	76-06-2	25

0325

STUDY TYPE INDEX

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
CHLOROPRENE	126-99-8	25
CHLOROPRENE	126-99-8	30
2-CHLORO-1-PROPANOL	78-89-7	17
CHLOROTHIOFORMIC ACID	EMTDP-49	17
P-CHLOROTOLUENE	106-43-4	17
3-CHLORO-P-TOLUIDINE	95-74-9	40
3-CHLORO-P-TOLUIDINE	95-74-9	30
4-CHLORO-O-TOLUIDINE HYDROCHLORIDE	3165-93-3	30
CHLORSULFAQUINOXALINE	98-56-6	8
CHLORSULFAQUINOXALINE	98-56-6	6
C.I. ACID ORANGE 3	6373-74-6	25
C.I. ACID ORANGE 3	6373-74-6	40
C.I. ACID ORANGE 10	1936-15-8	40
C.I. ACID ORANGE 10	1936-15-8	30
C.I. ACID RED 14	3567-69-9	30
C.I. ACID RED 114	6459-94-5	40
C.I. DIRECT BLACK 38	1937-37-7	25
C.I. DIRECT BLACK 114	61703-05-7	17
C.I. DIRECT BLUE 15	2429-74-5	40
C.I. DIRECT BLUE 218	28407-37-6	40
C.I. DIRECT ORANGE 6	6637-88-3	17
C.I. DISPERSE BLUE 1	2475-45-8	25
C.I. DISPERSE YELLOW 3	2832-40-8	30
C.I. FOOD BLACK 1	2519-30-4	6
C.I. FOOD BLACK 1	2519-30-4	8
C.I. PIGMENT RED 2	6041-94-7	17
C.I. PIGMENT RED 3	2425-85-6	25
C.I. PIGMENT RED 3	2425-85-6	40
C.I. PIGMENT RED 23	6471-49-4	25
C.I. PIGMENT RED 81	12224-98-5	17
C.I. SOLVENT YELLOW 14	842-07-9	30
C.I. VAT YELLOW 4	128-66-5	25
C.I. VAT YELLOW 4	128-66-5	40
TRANS-CINNAMALDEHYDE	14371-10-9	40
CITRIC ACID	77-92-9	40
CLONITRALID	1420-04-8	17
COAGULANTS, COAGULANT AIDS		109
COAL TAR		109
COBALT SULFATE HEPTAHYDRATE	10026-24-1	17
COCONUT DIETHANOLAMIDE	68603-42-9	25
COCONUT DIETHANOLAMIDE	68603-42-9	40
COLCHICINE	64-86-8	109
COUMAPHOS	56-72-4	40
COUMARIN	91-64-5	40
CREOSOTE	8021-39-4	17
M-CRESIDINE	102-50-1	25
P-CRESIDINE	120-71-8	25
CROTONALDEHYDE	4170-30-3	40

CHEMICAL	CAS NO.	PAGE
P-CUMYL PHENYL GLYCIDYL ETHER	61578-04-9	17
CUPFERRON	135-20-6	25
CYANIDE		66
CYCLIC NITROSAMINES		12
CYCLOHEXANONE, OXIME	100-64-1	6
CYCLOPENTAPHENANTHRENE	203-64-5	17
CYCLOPHOSPHAMIDE	50-18-0	25
CYCLOPHOSPHAMIDE	50-18-0	109
CYCLOSPORIN A	59865-13-3	17
CYCLOSPORIN A	59865-13-3	25
CYTARABINE	147-94-4	17
DAUNOMYCIN	20830-81-3	109
DAUNORUBICIN	20830-81-3	56
D AND C YELLOW NO. 11	8003-22-3	17
DDD	6088-51-3	17
DDT	50-29-3	109
DECANE	124-18-5	17
DEMECOLCINE	477-30-5	109
N-(DEOXYGUANOSINE-8-YL)-1-AMINOPYRENE		49
2,4-DIAMINOANISOLE SULFATE	39156-41-7	25
2,4-DIAMINODIPHENYLMETHANE	1208-52-2	17
4,4'-DIAMINO-2,2'-STILBENDEDIFULFONIC	81-11-8	40
4,4'-DIAMINO-2,2' STILBENEDISULFONIC ACID	81-11-8	25
2,4-DIAMINOTOLUENE	95-80-7	30
DIARYLANILIDE YELLOW	6358-85-6	40
DIARYLANILIDE YELLOW	6358-85-6	25
DIAZEPAM	439-14-5	17
DIBENZO-P-DIOXIN	262-12-4	40
DIBROMOETHANE	106-93-4	49
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	30
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	18
DIBROMOMANNITOL	488-41-5	30
2,3-DIBROMO-1-PROPANOL	96-13-9	25
DI-N-BUTYL ETHER	142-96-1	17
DIBUTYL PHTHALATE	84-74-2	40
DICHLORAN	99-30-9	30
DICHLOROACETONITRILE	3018-12-0	25
2,4-DICHLOROANILINE	554-00-7	18
2,4-DICHLOROBENZALDEHYDE	874-42-0	18
2,6-DICHLOROBENZALDEHYDE	83-38-5	18
3,4-DICHLOROBENZALDEHYDE	6287-38-3	18
P-DICHLOROBENZENE	106-46-7	40
1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	95-50-1	30
DICHLOROBENZOIC ACID	35915-19-6	18
5,6-DICHLORO-2-BENZOTHIAZOLAMINE	24072-75-1	40
2,2'-DICHLOROBIPHENYL	13029-08-8	18
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	30
CIS-DICHLORODIAMINE PLATINUM	15663-29-1	18

STUDY TYPE INDEX

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	25
2,7-DICHLORODIBENZO-P-DIOXIN	33857-26-0	25
1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN	118-52-5	40
DICHLORODIPHENYLTRICHLOROETHANE	50-29-3	25
1,1-DICHLOROETHANE	75-34-3	25
1,1-DICHLOROETHANE	75-34-3	18
1,2-DICHLOROETHANE	107-06-2	25
2,2-DICHLOROETHENYL DIMETHYL PHOSPHATE (9C1) [VAPONA]		110
CIS-1,2-DICHLOROETHYLENE	156-59-2	40
TRANS-1,2-DICHLOROETHYLENE	156-60-5	40
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	40
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	18
DICHLOROMETHANE (METHYLENE CHLORIDE)	75-09-2	25
2,6-DICHLORO-P-PHENYLENEDIAMINE	609-20-1	30
2,3-DICHLOROPROPYLENE	78-88-6	25
ALPHA,ALPHA-DICHLOROTOLUENE	611-19-8	18
N,N'-DICYCLOHEXYLTHIOUREA	1212-29-9	40
DIDEOXYADENOSINE		8
DIDEOXYCYTIDINE		8
DIDEOXYCYTIDINE		6
1,3-DI((N-(4,6-DIMETHYL-2-PYRIMIDINYL)-4-SULFAMOYLPHENYL))		49
DIELDRIN	60-57-1	25
DIETHYLDICHLOROSILANE	1719-53-5	18
DIETHYL [DIMETHOXYPHOSPHINYL) THIO]BUTANEDIOATE (9C1) [MALOXON]	1634-78-2	110
DIETHYLENE GLYCOL MONOBUTYL ETHER	112-34-5	18
N,N-DIETHYL-4-((5-NITRO-2THIAZOLYL)AZO) BENZENAMINE	54289-46-2	18
DI(P-ETHYLPHENYL) DICHLOROETHANE	72-56-0	25
N,N-DIETHYL-P-PHENYLENEDIAMINE	93-05-0	25
DIETHYL PHTHALATE	84-66-2	40
DIETHYLSTILBESTROL	56-53-1	110
DIGITONIN	11024-24-1	18
3,4-DIHYDROCOUMARIN	119-84-6	40
3,4-DIHYDROCOUMARIN	119-84-6	25
1,8-DIHYDROXY-4,5-DINITROANTHRAQUINONE	81-55-0	30
DIMETHOATE	60-51-5	40
3,3'-DIMETHOXYBENZIDINE-4,4' DIISOCYANATE	91-93-0	25
4,4'-DIMETHOXYDIPHENYLAMINE	101-70-2	25
2-(DIMETHYLAMINOETHYLAMINO)PYRIDINE	23826-72-4	49
DIMETHYLBENZANTHRACENE	57-97-6	49
DIMETHYLBENZANTHRACENE	57-97-6	110
2,2-DIMETHYLBUTANE	75-83-2	18
2,3-DIMETHYLBUTANE	79-29-8	18
DIMETHYLDITALLOW AMMONIUM CHLORIDE	68783-78-8	18
DIMETHYLFORMAMIDE	68-12-2	30
2,5-DIMETHYLFURAN	625-86-5	18
DIMETHYLNAPHTHALENE	28804-88-8	18
1,6-DIMETHYLNAPHTHALENE	575-43-9	18

CHEMICAL	CAS NO.	PAGE
1,3-DIMETHYL-2-NITROBENZENE	81-20-9	18
DIMETHYLNITROSAMINE	62-75-9	49
DIMETHYLNITROSAMINE	62-75-9	110
N,N-DIMETHYL-N-OCTADECYLBENZENEMETHANAMINIUM CHLORIDE	122-19-0	18
2,3-DIMETHYL-1-PENTANOL	10143-23-4	18
DIMETHYL PHENOL	1300-71-6	18
DIMETHYL PHTHALATE	131-11-3	40
DIMETHYL PHTHALATE	131-11-3	26
DIMETHYLSUCCINATE	106-65-0	18
DIMETHYL SULFOXIDE	67-68-5	26
DIMETHYL SULFOXIDE	67-68-5	18
N,N-DIMETHYLUREA	96-31-1	40
N,N'-DI-2-NAPTHYL-P-PHENYLENEDIAMINE	93-46-9	26
2,4-DINITROANILINE	97-02-9	40
2,4-DINITROANILINE	97-02-9	18
2,7-DINITRO-9H-FLUOREN-9-ONE	31551-45-8	26
1,5-DINITRONAPHTHALENE	605-71-0	18
1,3-DINITROPYRENE	75321-20-9	49
1,6-DINITROPYRENE	42397-64-8	49
1,8-DINITROPYRENE	42397-65-9	49
(3H)-1,3-DINITROPYRENE		49
(3H)-1,6-DINITROPYRENE		49
(3H)-1,8-DINITROPYRENE		49
DINITROPYRENE MIXTURE	EMTDP-35	18
2,4-DINITROTOLUENE	121-14-2	41
4,4'-DIOCTYLDIPHENYLAMINE	101-67-7	26
DIOXATHION	78-34-2	41
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	26
DIPHENHYDRAMINE HYDROCHLORIDE	147-24-0	41
DIPROPYLENE GLYCOL	25265-71-8	8
DIPROPYLENE GYCOL	25265-71-8	6
1,3-DI(4-SULFAMOYLPHENYL)TRIAZINE		50
DODECENYLSUCCINIC ANHYDRIDE	25377-73-5	6
TERT-DODECYL MERCAPTAN	25103-58-6	18
DOXORUBICIN	23214-92-8	56
DOXYLAMINE SUCCINATE	562-10-7	41
DOXYLAMINE SUCCINATE	562-10-7	26
DRINKING WATER CONTAMINANTS		111
ECONAZOLE	27220-47-9	18
ELLAGIC ACID	476-66-4	26
ENDOSULFAN	115-29-7	26
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES		105
EPHEDRINE SULFATE	134-72-5	26
EPICHLORHYDRIN	106-89-8	31
EPINEPHRINE	51-43-4	18
EPINEPHRINE	51-43-4	26
EPINEPHRINE	51-43-4	41

STUDY TYPE INDEX

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
1,2-EPOXYBUTANE	106-88-7	41
2,3-EPOXYBUTANE	3266-23-7	19
2,3-EPOXY-2,3-DIMETHYLBUTANE	5076-20-0	19
1,2-EPOXY-1,1,2,3,3,3-HEXAFLUOROPROPANE	428-59-1	19
ERGOTAMINE TARTRATE	379-79-3	6
ERGOTAMINE TARTRATE	379-79-3	8
ERYTHROMYCIN STEARATE	643-22-1	41
ETHIONAMIDE	536-33-4	19
ETHIONAMIDE	536-33-4	26
ETHIONAMIDE	536-33-4	41
ETHOXYLATED DODECYL ALCOHOL	9002-92-0	31
ETHYL ACETATE	141-78-6	26
ETHYL ACRYLATE	140-88-5	111
ETHYL ACRYLATE	140-88-5	111
ETHYL ALCOHOL	64-17-5	31
ETHYL ALCOHOL	64-17-5	19
ETHYL BROMIDE	74-96-4	41
ETHYL CHLORIDE	75-00-3	19
ETHYL CHLORIDE	75-00-3	26
N-ETHYL-N,N-DIPHENYLUREA	18168-01-9	19
ETHYLENE GLYCOL DIACRYLATE	2274-11-5	8
ETHYLENE GLYCOL DIACRYLATE	2274-11-5	6
ETHYLENE GLYCOL DIMETHACRYLATE	97-90-5	8
ETHYLENE GLYCOL DIMETHACRYLATE	97-90-5	6
ETHYLENE OXIDE	75-21-8	19
ETHYLENE OXIDE	75-21-8	26
ETHYLENE OXIDE	75-21-8	31
ETHYL ETHER	60-29-7	19
2-ETHYLHEXANOL	104-76-7	26
ETHYL METHACRYLATE	97-63-2	111
ETHYL METHANESULFONATE	62-50-0	111
N-ETHYL-4-NITROANILINE	3665-80-3	19
ETHYLNITROSOUREA	759-73-9	111
O-ETHYL PHENOL	90-00-6	19
FD AND C YELLOW NO. 6	2783-94-0	31
FD & C YELLOW NO. 6	2783-94-0	26
FERRIC AMMONIUM FERROCYANIDE	25869-00-5	26
FERRIC AMMONIUM FERROCYANIDE	25869-00-5	19
FLUOMETURON	2164-17-2	26
9-FLUORENONE	486-25-9	6
9-FLUORENONE	486-25-9	8
5-FLUORO-2'-DEOXYCYTIDINE	10356-76-0	41
5-FLUORO-2-DEOXYURIDINE		111
P-FLUOROPHENYLALANINE		111
FLURAZEPAM	17617-23-1	19
FLURAZEPAM	17617-23-1	26
FORMAMIDE	75-12-7	31
FORMANILIDE	103-70-8	19

CHEMICAL	CAS NO.	PAGE
FORMIC ACID	64-18-6	41
FORMIC ACID	64-18-6	19
FORMULATED FENAMINOSULF	140-56-7	41
FUMARIC ACID DINITRILE	EMTDP-73	19
FUMARIC ACID DINITRILE	EMTDP-73	26
FUMARYLACETONE		6
FURAN	110-00-9	26
FUROSEMIDE	54-31-9	26
GALLIUM ARSENIDE	1303-00-0	19
GERANYL ACETATE	105-87-3	31
GILSONITE	12002-43-6	19
GLUTARIC ACID	110-94-1	41
GRISEOFULVIN	126-07-8	111
GUAR GUM	9000-30-0	19
GUM ARABIC	9000-01-5	19
HALOACETONITRILES		111
HALO ALKYL PHOSPHATES		11
HC BLUE 2	33229-34-4	31
HC-BLUE-NO. 1	2784-94-3	50
HC YELLOW 4	52551-67-4	41
HC RED 3	2871-01-4	26
HEPTACHLOR	76-44-8	41
N-HEPTANAL	111-71-7	19
N-HEPTANOIC ACID	111-14-8	19
1,2,3,4,6,7-HEXABROMONAPHTHALENE	75625-24-0	19
HEXACHLOROBENZENE	118-74-1	26
1,2,3,4,7,7-HEXACHLOROBICYCLO(2.2.1)HMRP-2,5-DIENE	3389-71-7	19
HEXACHLORO-1,3-BUTADIENE	87-68-3	41
1,2,3,4,5,6-HEXACHLOROCYCLOHEXANE (3C1) [LINDANE]	58-89-9	112
HEXACHLOROCYCLOPENTADIENE	77-47-4	41
HEXACHLOROCYCLOPENTADIENE	77-47-4	26
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	19
1,2,3,7,8,9-HEXACHLORODIBENZOP-DIOXIN	19408-74-3	19
HEXACHLOROETHANE	67-72-1	41
HEXACHLOROPHENE	70-30-4	26
1,1,1,3,3,3-HEXAFLUORO-2-PROPANOL	920-66-1	19
HEXAMETHYLPHOSPHORAMIDE	680-31-9	31
N-HEXANE	110-54-3	26
N-HEXANE	110-54-3	41
1,6-HEXANEDIAMINE, DIHYDROCHLORIDE	6055-52-3	26
HEXYLBENZOATE	6789-88-4	19
HISTIDINOL		6
HUMIC ACID	1415-93-6	112
HYCANTHONE METHANESULFONATE	23255-93-8	19
HYDROQUINONE	123-31-9	31
N-HYDROXY-AMINOFLUORENE	53-94-1	51
2-(HYDROXYIMINO)-N-PHENYLACETAMIDE	1769-41-1	8
2-(HYDROXYIMINO)-N-PHENYLACETAMIDE	1769-41-1	6

0328

STUDY TYPE INDEX

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
HYDROXYLAMINE, HYDROCHLORIDE	5470-11-1	19
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	26
2-HYDROXY-1,4-NAPHTHOQUINONE	83-72-7	31
N-HYDROXYPHENACETIN	19315-64-1	51
N-HYDROXY-P-PHENETIDINE	19315-64-1	51
8-HYDROXYQUINOLINE	148-24-3	31
8-HYDROXYQUINOLINE SULFATE	134-31-6	31
IODACETIC ACID	64-69-7	19
IODINATED GLYCEROL	5634-39-9	26
IODOFORM	75-47-8	41
4-IPOMEANOL		8
ISOAMYL NITRITE	110-46-3	6
ISOBUTYL NITRITE	542-56-3	6
ISOPENTANE	78-78-4	19
ISOPENTANE	78-78-4	26
ISOPENTANE	78-78-4	31
ISOPRENE	78-79-5	26
ISOPRENE	78-79-5	31
P-ISOPROPOXYDIPHENYLAMINE	101-73-5	26
ISOPROPYL ACETATE	108-21-4	19
N-ISOPROPYLANILINE	768-52-5	20
N-ISOPROPYL-N'-PHENYL-PPHENYLENEDIAMINE	101-72-4	27
KAEMPFEROL	520-18-3	6
KAEMPFEROL	520-18-3	8
LANTHANUM NITRATE HEXAHYDRATE	10277-43-7	20
LAURIC ACID DIETHANOLAMINE CONDENSATE	120-40-1	27
LAURIC ACID DIETHANOLAMINE CONDENSATE	120-40-1	41
LAURYL CHLORIDE	112-52-7	20
LEAD DIMETHYLDITHIOCARBAMATE	19010-66-3	41
LINDANE	58-89-9	112
LINDANE	58-89-9	41
LIPID EPOXIDES		11
LITHIUM CHLORIDE	7447-41-8	112
LOCUST BEAN GUM	9000-40-2	20
MALAOXON	1634-78-2	31
MALATHION	121-75-5	41
MALEIC HYDRAZIDE	123-33-1	112
MALONIC ACID	141-82-2	41
MALTOL	118-71-8	27
MALTOL	118-71-8	31
MANGANESE SULFATE MONOHYDRATE	10034-96-5	41
MANNITOL	69-65-8	112
D-MANNITOL	69-65-8	31
MELPHALAN	148-82-3	20
D, L-MENTHOL	15356-70-4	112
DL-MENTHOL	15356-70-4	31
DL-MENTHOL	15356-70-4	20
2-MERCAPTOBENZIMIDAZOLE	583-39-1	41

CHEMICAL	CAS NO.	PAGE
MERCAPTOBENZOTHIAZOLE	149-30-4	41
2-MERCAPTO-4-METHYL-5THIAZOLYL METHYL KETONE	7725-93-1	20
6-MERCAPTOPURINE MONOHYDRATE	6112-76-1	31
6-MERCAPTOPURINE MONOHYDRATE	6112-76-1	20
METHANE	74-82-8	20
METHOTREXATE	59-05-2	112
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-60-0	41
6-METHOXY-2-BENZOTHIAZOLAMINE	1747-60-0	27
2-(P-METHOXYBENZYLAMINO)-PYRIDINE		52
3-((METHOXYCARBONYL)AMINO)PHENYL CARBAMATE	13684-63-4	20
2-METHOXYETHANOL	109-86-4	20
2-METHOXYETHYL ACETATE	110-49-6	27
METHOXYFLURANE	76-38-0	20
8-METHOXYPSORALEN	298-81-7	41
8-METHOXYPSORALEN	298-81-7	27
8-METHOXYPSORALEN	298-81-7	20
METHYL ACETATE	79-20-9	41
3-METHYLADENINE	5142-23-4	52
7-METHYLADENINE	935-69-3	52
METHYLBENZOATE	93-58-3	20
4-(6-METHYL-2-BENZOTHIAZOLYL)-BENZENAMINE	92-36-4	41
P-METHYL BENZYL ALCOHOL	589-18-4	20
METHYL BIPHENYL	28652-72-4	20
METHYL BROMIDE	74-83-9	20
METHYL [1-[(BUTYLAMINO) CARBONYL]-1H-BENZIMIDAZOL 2-YL]CARBAMATE (9C1) [BENOMYL]		113
METHYL CAPROATE	106-70-7	41
METHYL CARBAMATE	598-55-0	41
METHYL CHLORIDE	74-87-3	20
METHYLCYCLOPENTANE	96-37-7	20
METHYLDOPA	555-30-6	41
2,2'-METHYLENE-BIS (4-CHLOROPHENOL)	97-23-4	20
2,2'-METHYLENE BIS(PHENYLENEOXYMETHYLENE)BISOXIRANE	39817-09-9	20
METHYLENE BIS(THIOCYANATE)	6317-18-6	20
METHYLENEDIANILINE	101-77-9	20
4,4'-METHYLENEDIANILINE DIHYDROCHLORIDE	13552-44-8	31
2-METHYL-2-ETHOXYPROPANE	637-92-3	20
METHYL ETHYL KETOXIME	96-29-7	27
METHYL ETHYL KETOXIME	96-29-7	20
9-METHYL FLUORENE	2523-37-7	20
METHYL FORMATE	107-31-3	20
METHYL FORMATE	107-31-3	42
METHYL-P-FORMYL BENZOATE	1571-08-0	20
2-METHYL FURAN	534-22-5	20
METHYLGLUTARONITRILE	4553-62-2	20
2-METHYLGLYCIDYL ACRYLATE	19900-46-0	20
METHYL ISOBUTYL KETONE	108-10-1	20
METHYL ISOCYANATE	624-83-9	6

STUDY TYPE INDEX

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
METHYL ISOCYANATE	624-83-9	8
METHYL ISOCYANATE	624-83-9	13
METHYL METHACRYLATE	80-62-6	113
METHYL METHACRYLATE	80-62-6	113
METHYL METHANESULFONATE	66-27-3	52
METHYL METHANESULFONATE	66-27-2	113
3-METHYL-6-METHOXY-2AMINO-BENZOTHIAZOLIUM CHLORIDE	NOCAS0884	21
2-METHYL-2-(METHYLTHIO)PROPIONALDOXIME	1646-75-9	6
2-METHYL-2-(METHYLTHIO)ROPIONALDOXIME	1646-75-9	8
METHYL NAPHTHALENE	1321-94-4	21
N-METHYL-N-NITROSOGUANIDINE	70-25-7	113
N-METHYLOLACRYLAMIDE	924-42-5	42
N-METHYLOLACRYLAMIDE	924-42-5	27
METHYL PARATHION	298-00-0	42
METHYL PENTACHLOROSTEARATE	26638-28-8	21
1-METHYL PHENANTHRENE	832-28-8	21
2-METHYL PHENANTHRENE	2531-84-2	21
1-METHYL PYRENE	2381-21-7	21
6-METHYLQUINOLINE	91-62-3	27
7-METHYLQUINOLINE	612-60-2	27
8-METHYLQUINOLINE	611-32-5	27
METHYL STEARATE	112-61-8	42
ALPHA-METHYLSTYRENE	98-83-9	21
ALPHA-METHYLSTYRENE	98-83-9	27
METHYL SUCCINIC ACID	498-21-5	21
METHYL-P-TOLUATE	99-75-2	21
METHYL TRIFLUOROMETHANESULFONATE	333-27-7	21
METHYL VALERATE	624-24-8	42
METHYL VINYL KETONE	78-94-4	21
MEXACARBATE	315-18-4	21
MITOMYCIN-C		113
MOLYBDENUM TRIOXIDE	1313-27-5	42
MONO(2-ETHYLHEXYL)ADIPATE	4337-65-9	41
MONO(2-ETHYLHEXYL)PHTHALATE	4376-20-9	42
MONOSODIUM GLUTAMATE	142-47-2	21
MONURON	150-68-5	42
MONURON	150-68-5	113
MUTAGENIC AGENTS		76
MYLERAN		113
MYLERAN	55-98-1	31
NAPHTHALENE	91-20-3	27
1-NAPHTHALENYL METHYLCARBAMATE (9C1) [SEVIN]		113
1-NAPHTHYLAMINE	134-32-7	27
N-(1-NAPHTHYL)ETHYLENEDIAMINE DIHYDROCHLORIDE	1465-25-4	42
NICKEL SUBSULFIDE	12035-72-2	21
NIFEDIPINE	21829-25-4	21
NITHIAZIDE	139-94-6	27
NITRILES		66
9-NITROANTHRACENE	602-60-8	27
4-NITROANTHRANILIC ACID	619-17-0	42
4-NITRO-1,3-BENZENEDIAMINE	5131-58-8	27
O-NITROBENZOIC ACID	552-16-9	27
O-NITROBENZOIC ACID	552-16-9	21
6-NITROBENZO(A)PYRENE	63041-90-7	52
P-NITROBENZOYL CHLORIDE	122-04-3	27
2-NITROETHANOL	625-48-9	21
NITROFEN	1836-75-5	114
2-NITROFLUORENE	607-57-8	114
NITROFURANTOIN	67-20-9	27
2-NITRO-2-METHYLANTHRAQUINONE	129-15-7	114
O-NITROPHENOL	88-75-5	31
M-NITROPHENOL	554-84-7	31
P-NITROPHENOL	100-02-7	42
2-NITRO-P-PHENYLENEDIAMINE	5307-14-2	21
4-NITRO-O-PHENYLENEDIAMINE	99-56-9	31
5-(4-NITROPHENYL)PENTA2,4-DIENAL		6
5-(4-NITROPHENYL)PENTA2,4-DIENAL		8
4-NITROPHTHALIC ANHYDRIDE	5466-84-2	21
3-NITROPROPIONIC ACID	504-88-1	114
NITROPRUSSIDE	15078-28-1	66
1-NITROPYRENE	5522-43-0	21
1-NITROPYRENE	5522-43-0	52
1-NITROPYRENE	5522-43-0	114
(3H)-1-NITROPYRENE		52
N-NITROSODIETHANOLAMINE	1116-54-7	42
N-NITROSODIPHENYLAMINE	86-30-6	27
P-NITROSODIPHENYLAMINE	156-10-5	27
N-NITROSO-N-ETHYLURETHANE	614-95-9	21
4-NITROSOPHENOL	104-91-6	21
1-NITROSOPYRENE		53
BETA-NITROSTYRENE	102-96-5	27
BETA-NITROSTYRENE	102-96-5	21
P-NITROTOLUENE	99-99-0	42
NONANE	111-84-2	21
NTA(NITRILOTRIACETIC ACID)	139-13-9	31
OCHRATOXIN A	303-47-9	27
OLEIC ACID DIETHANOLAMINE	13961-86-9	42
OLEIC ACID DIETHANOLAMINE	13961-86-9	27
OLIVETOL	500-66-3	21
ONCOVIN	2068-78-2	114
OXALIC ACID	144-62-7	42
OXAZEPAM	604-75-1	21
OXAZEPAM	604-75-1	27
1,1-OXYBIS METHYLENE, BIS BENZENE	103-50-4	21
4,4'-OXYDIANILINE	101-80-4	31
OXYTETRACYCLINE HYDROCHLORIDE	2058-46-0	42

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
PENTACHLOROPHENOL DOWICIDE EC-7	87-86-5	42
2,4,A,A,A-PENTACHLOROTOLUENE	13014-18-1	21
A,A,A,3,4-PENTACHLOROTOLUENE	13014-24-9	21
PENTAERYTHRITOL TETRANITRATE	78-11-5	27
PENTAETHYLENEHEXAMINE	4067-16-7	31
PENTAMETHYLPARAROSANILINE	603-47-4	54
N-PENTANAL	110-62-3	21
N-PENTANE	109-66-0	21
2-PENTANONE	107-87-9	21
2-PENTENENITRILE	13284-42-9	21
3-PENTENENITRILE	4635-87-4	21
PERCHLOROMETHYL MERCAPTAN	594-42-3	21
PHENACETIN	62-44-2	42
PHENANTHRENEIMINES		13
PHENESTERIN	3546-10-9	27
M-PHENETIDINE	621-33-0	21
PHENFORMIN HYDROCHLORIDE	834-28-6	42
M-PHENYLENEDIAMINE	108-45-2	27
O-PHENYLENEDIAMINE	95-54-5	27
P-PHENYLENEDIAMINE DIHYDROCHLORIDE	624-18-0	31
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	27
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	42
N-PHENYL-P-PHENYLENEDIAMINE	101-54-2	42
PHENYLPHOSPHINE	638-21-1	22
1-PHENYL-2-THIOUREA	103-85-5	42
PHENYTOIN (DIPHENYLHYDANTOIN)	57-41-0	42
PHORBOL-12-MYISTATE-13-ACETATE		115
PHOSPHATE ESTER MIXTURE:NC220	EMTDP-45	22
PHTHALAMIDE	88-96-0	115
PHTHALIC ACID	88-99-3	22
PHTHALIC ANHYDRIDE	85-44-9	42
PHTHALIC ANHYDRIDE	85-44-9	115
PHYLLANTHOSIDE		8
PICRIC ACID	88-89-1	27
PODOPHYLLOTOXIN	518-28-5	6
PODOPHYLLOTOXIN	518-28-5	8
POLYCYCLIC HYDROCARBONS		77
POLYETHYLENE AS	9002-88-4	22
POLYSORBATE 80 (GLYCOL)	9005-65-6	42
POLYSORBATE 80 (GLYCOL)	9005-65-6	27
POLYSTYRENE	9003-53-6	22
POLYTHIAZIDE	346-18-9	22
POTASSIUM DICHROMATE	7778-50-9	22
POTASSIUM FLUORIDE	7789-23-3	42
POTASSIUM SUPEROXIDE		116
PRIMACLONE	125-33-7	8
PRIMACLONE	125-33-7	6
PRIORITY AIR POLLUTANTS		116

CHEMICAL	CAS NO.	PAGE
PROBENECID	57-66-9	42
PROBENECID	57-66-9	27
PROCARBAZINE HYDROCHLORIDE	366-70-1	116
PROFLAVINE		116
PROMETHAZINE HYDROCHLORIDE	58-33-3	42
PROPANIL	709-98-8	54
PROPIONIC ACID	79-09-4	42
PROPIONIC ACID	79-09-4	22
PROPIONIC ACID, METHYL ESTER	554-12-1	42
PROPIONITRILE	107-12-0	27
PROPYLENE	115-07-1	22
PROPYLENE	115-07-1	27
PROPYLENE	115-07-1	31
PROPYLENE	115-07-1	42
PROPYLENE OXIDE	75-56-9	27
PROPYLENE OXIDE	75-56-9	42
1,2-PROPYLENE OXIDE	75-56-9	31
1,3-PROPYLENE OXIDE	503-30-0	28
PROPYL GALLATE	121-79-9	31
N-PROPYL NITRITE	543-67-9	6
PYRILAMINE	91-84-9	28
PYRILAMINE	91-84-9	54
PYRILAMINE MALEATE	59-33-6	42
QUERCETIN	117-39-5	42
QUERCETIN	117-39-5	22
QUERCETIN	117-39-5	28
QUINACRINE MUSTARD DIHYDROCHLORIDE		116
QUINETHAZONE (AQUAMOX)	73-49-4	22
QUINOLINES		11
QUINOLINE SULFATE	530-66-5	31
RESERPINE	50-55-5	116
RHODAMINE 6G	989-38-3	28
ROXARSONE	121-19-7	28
ROXARSONE	121-19-7	31
SACCHARIN, SODIUM SALT		116
SALICYLAZOSULFAPYRIDINE	599-79-1	28
SAXITOXIN	35523-89-8	93
SCOPOLAMINE HYDROBROMIDE	114-49-8	28
SEBACIC ACID	111-20-6	42
SELENIUM SULFIDE	7446-34-6	116
SELENIUM SULFIDE	7446-34-6	31
SELSUIN		22
SESAMOL	533-31-3	6
SESAMOL	533-31-3	8
SODIUM AZIDE	26628-22-8	28
SODIUM AZIDE	26628-22-8	42
SODIUM AZIDE	26628-22-8	116
SODIUM BISULFITE		13

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
SODIUM CYANURATE	2624-17-1	22
SODIUM FLUORIDE	7681-49-4	42
SODIUM IODOMETHANESULFONATE	126-31-8	22
SODIUM LAUROYLISETHIONATE	7381-01-3	6
SODIUM LAUROYLISETHIONATE	7381-01-3	8
SODIUM SELENITE	10102-18-8	6
SODIUM XYLENESULFONATE	1300-72-7	28
SODIUM XYLENESULFONATE	1300-72-7	42
SPIRO(ISOBENZOFURAN-1 (3H) 9' (9H)XANTHEN)-3-ONE 2',4',4',7'-TETRABROMO-3',6'DIHYDROXY DISODIUM SALT	17372-87-1	22
STANNOUS CHLORIDE	7772-99-8	31
STEARIC ACID	57-11-4	43
STYRENE	100-42-5	28
SUCCINIC ACID	110-15-6	43
SUCCINIC ACID 2,2-DIMETHYLHYDRAZIDE	1596-84-5	43
SUCCINIC ANHYDRIDE	108-30-5	43
SUCCINYLACETONE	51568-18-4	6
SUCROSE	57-50-1	43
SULFAMETHAZINE	57-68-1	28
SULFAMETHAZINE	57-68-1	43
SULFAMETHAZINE TRIAZENE		55
SULFISOXAZOLE	127-69-5	31
3-SULFOLENE	77-79-2	43
TALC	14807-96-6	43
TARA GUM	39300-88-4	22
1,2,3,4-TCDD	30746-58-8	22
1,1,2,3-TETRACHLORO-BUTADIENE	921-09-5	22
TETRACHLORODIPHENYLETHANE	72-54-8	28
1,1,2,2-TETRACHLOROETHANE	79-34-5	43
2,3,5,6-TETRACHLORO-4-NITROANISOLE	2438-88-2	22
2,3,4,5-TETRACHLOROPHENOL	4901-51-3	28
2,3,4,6-TETRACHLOROPHENOL	58-90-2	28
TETRACHLOROPHTHALIC ANHYDRIDE	117-08-8	32
TETRACHLORVINPHOS	961-11-5	28
TETRACHROMIC ACID, POTASSIUM ZINC SALT	12433-50-0	22
TETRAETHYLENEPENTAMINE	112-57-2	32
TETRAFLUOROETHYLENE	116-14-3	22
TETRAFLUOROETHYLENE	116-14-3	28
1-TRANS-DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	32
TETRAKIS(HYDROXYMETHYL) PHOSPHONIUM SULFATE	55566-30-8	28
3,3',5,5'-TETRAMETHYLBENZIDINE	54827-17-7	32
N,N,N',N'-TETRAMETHYLPARAROSANILINE		55
N,N,N',N'-TETRAMETHYL-P-PHENYLENEDIAMINE	100-22-1	28
TETRANITROMETHANE	509-14-8	28
1,3,6,8-TETRANITROPYRENE	28767-61-5	22
4,4'-THIODIANILINE	139-65-1	28
6-THIOGUANINE		117

CHEMICAL	CAS NO.	PAGE
THIOPHANATE M	23564-05-8	22
TITANIUM DIOXIDE	13463-67-7	32
TITANOCENE DICHLORIDE	1271-19-8	28
TITANOCENE DICHLORIDE	1271-19-8	43
TOLAZAMIDE	1156-19-0	43
TOLBUTAMIDE	64-77-7	43
TOLUENE	108-88-3	43
2,6-TOLUENEDIAMINE DIHYDROCHLORIDE	15481-70-6	32
2,5-TOLUENEDIAMINE SULFATE	6369-59-1	43
2,4-TOLUENE DIISOCYANATE	584-84-9	28
2,4-&2,6-TOLUENE DIISOCYANATE	26471-62-5	28
TOLUENE (NITRATION GRADE)	108-88-3	28
P-TOLUIC ACID	25567-10-6	22
P-TOLUNITRILE	104-85-8	22
TRIALLYL ISOCYANURATE	1025-15-6	28
TRIAMTERENE	396-01-0	43
TRIBENZYL ISOCYANURATE	606-03-1	22
TRIBUTYL PHOSPHATE	126-73-8	22
2,4,6-TRICHLOROANILINE	634-93-5	22
1,1,2-TRICHLOROETHANE	79-00-5	28
1,1,2-TRICHLOROETHANE	79-00-5	32
TRICHLOROETHYLENE (WITHOUT EPICHLOROHYDRIN)	79-01-6	32
TRICHLOROMELAMINE	7673-09-8	22
2,4,6-TRICHLORONITROBENZENE	18708-70-8	22
3,4,6-TRICHLORO-2-NITROPHENOL	82-62-2	22
2,3,5-TRICHLOROPHENOL	933-78-8	28
TRIFLUORTHYMIDINE	70-00-8	118
TRIMELLITIC ANHYDRIDE	552-30-7	28
TRIMETHYL ISOCYANURATE	827-16-7	22
TRIMETHYLOLPROPANE TRIACRYLATE	15625-89-5	6
TRIMETHYLOLPROPANE TRIACRYLATE	15625-89-5	8
TRIMETHYLOLPROPANE TRIMETHACRYLATE	3290-92-4	7
TRIMETHYLOLPROPANE TRIMETHACRYLATE	3290-92-4	8
TRIMETHYLPHOSPHATE	512-56-1	28
TRIMETHYLPHOSPHATE	512-56-1	22
1,3,6-TRINITROPYRENE	75321-19-6	22
2,4,6-TRINITROTOLUENE	118-96-7	23
TRIPELENNAMINE HYDROCHLORIDE	154-69-8	43
TRI-N-PROPYLAMINE	102-69-2	23
TRIS(CARBAMOYLMETHYL)ISOCYANURATE	1843-48-7	23
TRIS(2-CHLOROETHYL) PHOSPHATE	115-96-8	43
TRIS(2,3-EPOXYPROPYL)-CYANURATE	2451-62-9	23
TRIS- (2,3-EPOXYPROPYL) ISOCYANURATE	2451-62-9	28
TRIS(2-ETHYLHEXYL) PHOSPHITE	301-13-3	28
TRIS(2-KETOPROPYL)ISOCYANURATE	61050-97-3	23
TRISODIUM NITRILOTRIACETATE MONOHYDRATE	18662-53-8	23
TRIS(TRIPHENYLSTANNYL)ISOCYANURATE	752-74-9	23
O-TRITOLYL PHOSPHATE	78-30-8	23

MUTAGENESIS/GENETIC TOXICITY

CHEMICAL	CAS NO.	PAGE
P-TRITOLYL PHOSPHATE	78-32-0	23
L-TRYPTOPHAN	73-22-3	43
TURMERIC, OLEORESIN (CURCUMIN)	8024-37-1	28
TURMERIC OLEORESIN (CURCUMIN)	8024-37-1	43
URETHANE	51-79-6	23
URETHANE	51-79-6	28
URETHANE	51-79-6	32
URETHANE	51-79-6	118
UROTROPINE	100-97-0	23
N-VALERIC ACID	109-52-4	43
VALERONITRILE	110-59-8	23
VALIUM (DIAZEPAM)	439-14-5	28
VANADIUM PENTOXIDE	1314-62-1	23
VINYL CARBAMATE		118
P-VINYL GUAIACOL	7786-61-0	7
P-VINYL GUAIACOL	7786-61-0	8
VINYLIDENE CHLORIDE (1,1DICHLOROETHYLENE	75-35-4	43
VINYLIDENE CHLORIDE (1,1-DICHLOROETHYLENE)	75-35-4	29
VINYLIDENE FLUORIDE	75-38-7	23
VINYLIDENE FLUORIDE	75-38-7	29
VITAMIN D	1406-16-2	23
WOLLASTONITE CALCIUM SILICATES	13983-17-0	43
WOLLASTONITE CALCIUM SILICATES	13983-17-0	29
XYLENES, COMMERCIAL MIXTURE	1330-20-7	29
ZIRCONIUM OXYCHLORIDE	7699-43-6	7

NEUROLOGIC/BEHAVIORAL TOXICITY

CHEMICAL	CAS NO.	PAGE
3-ACETYLPYRIDINE	350-03-8	106
ACRYLAMIDE	79-06-1	106
ACRYLAMIDE	79-06-1	73
ALCOHOL	64-17-5	85
ALLOPUMILIOTOXIN		73
ALUMINUM	7429-90-5	56
3-AMINOPYRIDINE	79-06-1	106
AMITRAZ	33089-61-1	106
AMPHETAMINE	300-62-9	48
ANESTHETICS		83
ANTICONVULSANTS		88
ANTICONVULSANTS		83
ANTICONVULSANTS		84
APPETITE SUPPRESSANTS		73
ARTIFICIAL FOOD DYES		83
AZACHOLESTEROL COMPOUNDS		86
AZINPHOS-METHYL	86-50-0	106
BAPIVACAINE	2180-92-9	73
BARBITURATES		73
BATRACHOTOXININ A	19457-37-5	73
BENZODIAZEPINE		74
BENZODIAZEPINES		103
BIS-TRIBUTYL TIN OXIDE	56-35-9	117
P-BROMOPHENYLACETYLUREA		65
ALPHA BUNGAROTOXIN	11023-79-4	83
TERT-BUTANOL	75-65-0	58
CADMIUM	7440-43-9	107
CAPSAICIN	404-86-4	107
CARBAMAZEPINE	298-46-4	86
CARBARYL	63-25-2	107
CARBON MONOXIDE	630-08-0	107
CHLORDECONE (KEPONE)	143-50-0	108
CHLORDIMEFORM	6164-98-3	108
CLONIDINE		48
CLONIDINE		62
CONTAMINANTS		112
CONVULSANTS		83
CRYOLITE	15096-52-3	109
CYPERMETHRIN	52315-07-8	109
DDT	50-29-3	109
DEBRISOQUINE		62
DEXAMETHASONE	50-02-2	49
20,25-DIAZACHOLESTEROL	313-05-3	88
DIAZEPAM	439-14-5	88
DIAZINON	333-41-5	109
DICHLOROBENZOIC ACIDS		68
CIS-DICHLORODIAMINE PLATINUM	15663-27-1	83
2,4-DICHLOROPHENOXYACETATE		88
DIETHYLDITHIOCARBAMIC ACID	148-18-5	110
DIETHYLSTILBESTROL	56-53-1	83
4-(3',4'-DIHYDROXYPHENYL)PYRIDINE		75
DIHYDROXYTRYPTAMINE	5090-36-8	110
DIISOPROPYL FLUOROPHOSPHATE	55-91-4	110
DIMERCAPROL (BAL)	59-52-9	110
DIMERCAPTOSUCCINIC ACID	304-55-2	110
DINOSEB	88-85-1	110
DIPHENYLHYDANTOIN	57-41-0	86
DIPHTHERIA TOXINS		88
DIPROPYLACETIC ACID	99-66-1	88
2,4-DITHIOBIURET	541-53-7	110
ENDOSULFAN	115-29-7	111
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
ETHANOL	64-17-5	111
FENTHION	55-38-9	111
FORMETANATE	23422-53-9	111
GEPHYROTOXIN	55893-12-4	76
HALOBENZENES		89
HEXACHLOROPHENE	70-30-4	89
HISTRIONICOTOXIN	34685-67-1	76
IMINODIPROPIONITRILE	111-94-4	112
IN VITRO NEUROTOXICITY		83
KAINIC ACID	487-79-6	84
KAINIC ACID	487-79-6	84
KAINIC ACID	487-79-6	89
KANAMYCIN SULFATE	25389-94-0	112
LEAD	7439-92-1	62
LEAD	7439-92-1	84
LEAD	7439-92-1	112
LOFEXIDINE		51
MANGANESE	7439-96-5	84
CIS METHRIN	35764-59-1	112
DELTA METHRIN	52918-63-5	113
METHYL ETHYL KETONE	78-93-3	58
METHYL ISOBUTYL KETONE	108-10-1	58
METHYL MERCURIC CHLORIDE	115-09-3	52
METHYL MERCURIC CHLORIDE	115-09-3	113
METHYL MERCURY	22967-92-6	65
METHYLPHENIDATE	113-45-1	62
1-METHYL-4-PHENYL-1,2,3,6 TETRAHYDROPYRIDINE	28289-54-5	113
2-METHYLPYRIDINE	109-06-8	113
METRAZOLE	54-95-5	90
MIPAFOX	371-86-8	113
MONOSODIUM GLUTAMATE	142-47-2	113
MORPHOLINE	110-91-0	113
MPTP (1-METHYL-4-PHENYL1,2,3,6-TETRAHYDROPYRIDINE)		103
MPTP N-OXIDE		76

STUDY TYPE INDEX

NEUROLOGIC/BEHAVIORAL TOXICITY

CHEMICAL	CAS NO.	PAGE
NEUROTOXINS		77
NEUROTOXINS		89
NEUROTOXINS		93
NEUROTOXINS		94
OLIGOMYCIN	1404-19-9	95
PENTYLENETETRAZOLE	54-95-5	95
PERHYDROHISTRIONICOTOXIN	40709-29-3	77
PERMETHRIN	52645-53-1	115
PESTICIDES		115
PHENOBARBITAL	50-06-6	84
PHENOBARBITAL	50-06-6	84
PHENOBARBITAL	50-06-6	95
PHENYLMETHANE-SULFONYLFLUORIDE		115
PHENYTOIN	57-41-0	57
PHENYTOIN	57-41-0	95
PRIORITY AIR POLLUTANTS		116
PUMILIOTOXIN		77
PYRETHROIDS (VARIOUS)		116
RESERPINE	50-55-5	54
RETINOIC ACID	302-79-4	54
SIDE STREAM SMOKE		116
STREPTOZOTOCIN	18883-66-4	77
STYRENE	100-42-5	116
STYRENE OXIDE	96-09-3	116
SULFOLENE	126-33-0	116
TETRAHYDROCANNABINOL	1972-08-3	55
DELTA-9-TETRAHYDROCANNABINOL	1972-08-3	104
THALLIUM	7440-28-0	117
TOLUENE	108-88-3	117
TRIADIMEFON	43121-43-3	117
TRIADIMENOL	55219-65-3	117
TRICHLOROBENZOIC ACIDS	1319-85-3	96
TRIETHYLTIN	2767-54-6	118
TRIMETHYLTIN		65
TRIMETHYLTIN	56-24-6	118
TRIORTHOCRESYL-PHOSPHATE	78-30-8	118
TRIPHENYLPHOSPHITE	101-02-0	118
TRIPHENYLTIN	639-58-7	118
VALPROIC ACID	99-66-1	63
VOLATILE ORGANIC DRINKING WATER CONTAMINANTS		118
M-XYLENE	108-38-3	118
P-XYLENE	106-42-3	118
XYLENES	1330-20-7	118

NUTRITIONAL STUDIES

CHEMICAL	CAS NO.	PAGE
2-ACETYLAMINOFLUORENE	53-96-3	47
APPETITE SUPPRESSANTS		73
P-BROMOPHENYLACETYLUREA		
CADMIUM	7440-43-9	44
FENFLURAMINE		62
FOLATE		62
IRON	7439-89-6	76
MANGANESE	7439-96-5	44
METHYL MERCURY	22967-92-6	65
MONOGLUTAMIC FOLATE		61
ORAL CONTRACEPTIVES		61
RETINOIDS		64
TRIMETHYLTIN		65
VITAMIN E		45

0336

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	47
ACETAMINOPHEN	103-90-2	73
ACETOPHENETIDIN	62-44-2	71
N4-ACETYLSULFAMETHAZINE	100-90-3	47
ALIPHATIC NITRILES		66
ALLOPUMILIOTOXIN		73
ALLYL ALCOHOL	107-18-6	106
ALLYLAMINE (ALIPHATIC AMINES)	107-11-9	66
6-AMINOBENZO(A)PYRENE	7428-83-3	47
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		73
3-AMINOPYRENOL		48
6-AMINOPYRENOL		48
8-AMINOPYRENOL		48
AMSONIC ACID		14
ANALGESICS		73
ANTIBIOTICS		85
ANTITRYPANOSOMAL COMPOUNDS		73
APPETITE SUPPRESSANTS		73
AROMATIC AMINES		105
ASCORBIC ACID	50-81-7	44
ATP	56-65-5	86
ATRAZINE	1912-24-9	106
AUTOMOBILE EXHAUST		68
BAPIVACAINE	2180-92-9	73
BARBITURATES		73
BATRACHOTOXININ A	19457-37-5	73
BENZ(C)ACRIDINE	225-51-4	74
BENZANTHRACENE	56-55-3	74
BENZENE	71-43-2	14
BENZODIAZEPINE		74
BENZOIC ACID	65-85-0	74
BENZO(A)PYRENE	50-32-8	74
N-BENZOYLOXY-N-METHYL-4-AMINOBENZENE		48
BROMOBENZENE	108-86-1	107
BETA-BROMO-BETA-NITROSTYRENE	7166-19-0	14
BUPIVACAINE		97
1,3-BUTADIENE	106-99-0	14
2-BUTOXYETHANOL	111-76-2	12
CALCIUM CHANNEL BLOCKERS		12
CAPTAN		107
CARBACHOL	51-83-2	86
CARBARYL	63-25-2	107
CARBOFURAN		107
CARBON TETRACHLORIDE	56-23-5	74
CARBOPLATIN		102

CHEMICAL	CAS NO.	PAGE
CEPHEMS		87
CHLORAMINE	10599-90-3	108
CHLORDECONE (KEPONE)	143-50-0	108
CHLORINE (CHLORINATED DRINKING ATER)	7990-92-3	108
CHLORINE DIOXIDE	10049-04-4	108
CHLOROACETIC ACID	79-01-7	108
N-(3-CHLOROALLYL)HEXAMINIUM CHLORIDE	4080-31-3	14
CHLOROFORM	67-66-3	108
CHLOROPROMAZINE	50-53-3	81
1-CHLORO-2-PROPANOL	127-00-4	14
CHLORPYRIFOS		109
CHOLESTEROL OXIDES		44
1,8-CINEOLE	470-82-6	48
CINNAMALDEHYDE	104-55-2	48
CITRAL	5392-40-5	12
COLCHICINE	64-86-8	87
CYCLOSPORINE		97
DAPSONE		71
D AND C YELLOW #11	8003-22-3	14
1-DEUTERO-NAPHTHALENE		49
DIBROMOCHLOROPROPANE	96-12-8	74
1,2-DICHLOROBENZENE	95-50-1	14
CIS-DICHLORODIAMINEPLATINUM	15663-27-1	102
CIS-1,2 -DICHLOROETHYLENE	156-59-2	110
2,6-DICHLORO-P-PHENYLENEDIAMINE	609-20-1	110
N-(3,5-DICHLOROPHENYL) SUCCINIMIDE		74
DIESEL EMISSION PARTICLES		110
4,5-DIHYDROXY-1,3-BIS(HYDROXY METHYL)-2-IMIDAZOLIDINONE		14
4-(3',4'-DIHYDROXYPHENYL)PYRIDINE		75
DIHYDROXY PROPYL GUANOSINE		99
N,N-DIMETHYL-4-AMINOBENZENE		49
DIMETHYLBENZANTHRACENE	57-97-6	49
DIMETHYL HYDROGEN PHOSPHITE	868-85-9	12
N-(2,2-DIMETHYL-HYDROXYETHYL)-4-METHYLBENZAMIDE		49
DIMETHYLNITROSAMINE	62-75-9	75
DINOSEB	88-85-1	110
DI-PENTYLPHTHALATE	131-18-0	12
DOPAMINE	51-61-6	81
DOXYLAMINE	469-21-6	50
DOXYLAMINE	469-21-6	50
DOXYLAMINE	469-21-6	50
DOXYLAMINE (14-C)	469-21-6	50
DSMA(DISODIUM METHANEARSENATE)		110
ENERGY-RELATED MIXTURES		105
ENFLUREANE	13838-16-9	75
EPICHLOROHYDRIN	106-89-8	75
ESTRADIOL	50-28-2	50
ESTRADIOL	50-28-2	50

STUDY TYPE INDEX

PHARMACOKINETICS/METABOLISM

CHEMICAL	CAS NO.	PAGE
ETHANOL	64-17-5	66
ETHIONINE	13073-35-3	75
ETHYL ALCOHOL	64-17-5	111
ETHYLENE DIBROMIDE	106-93-4	75
TRANS FATTY ACIDS		44
FLUBOPROFEN		98
FOLPET		111
FUROSEMIDE	54-31-9	75
GENTAMICIN	1403-66-3	75
GENTIAN VIOLET	548-62-9	50
GEPHYROTOXIN	55893-12-4	89
GEPHYROTOXIN	55893-12-4	76
GLIOTOXINS		89
GLYCOL ETHER ACETATES		14
GLYPHOSATE	1071-83-6	14
GONYAUTOXINS	35554-08-6	89
GRISEOFULVIN	126-07-8	89
N-(GUANOSINE-8-YL)-4-AMINOBIPHENYL		50
HALOGENATED ACETONITRILES		111
HALOGENATED DIBENZOFURANS		12
HAZARDOUS AIR POLLUTANTS		112
HEXACHLOROBENZENE	118-74-1	112
HEXACHLOROBIPHENYL		112
HISTRIONICOTOXIN	34685-67-1	76
N-HYDROXYACETAMINOPHEN	63975-21-3	50
N-HYDROXY-1-ACETYLAMINOPYRENE		51
2-HYDROXY-4-METHOXYBENZOPHENONE	131-57-7	14
N-HYDROXYPHENACETIN	19315-64-1	51
N-HYDROXY-P-PHENETIDINE	19315-64-1	51
IPRONIAZID	54-92-2	76
IPROPLATIN		102
IRON CHELATES		76
ISOPRENE	78-79-5	14
ISOPROTERENOL	7683-59-2	99
KARATHANE		112
LASALOCIDS	11054-70-9	89
LEAD		112
LEVODOPA	59-92-7	82
LEVONORGESTREL		60
LIDOCAINE		99
LINDANE	58-89-9	112
LIPID SOLUBLE DRUGS		89
LOCAL ANESTHETICS		90
MAGNESIUM	7439-95-4	90
MANGANESE	7439-96-5	44
MERCURIC CHLORIDE	7487-94-7	112
METHOTREXATE	59-05-2	102
METHYLCARBAMATE	598-55-0	113

CHEMICAL	CAS NO.	PAGE
METHYLENE-BIS-THIOCYANATE	6317-18-6	14
1-METHYL-4-PHENYL-1,2,3,6TETRAHYDROPYRIDINE(MPTP)		76
N-METHYLSULFAMETHAZINE		52
3-METHYLTHYMIDINE	958-74-7	52
METHYLTHYMIDYLYL(3'-5')THYMIDINE		52
MPTP N-OXIDE		76
MSMA (MONOSODIUM METHANEARSENATE)	2163-80-6	113
B-NAPHTHOFLAVONE		113
1-NAPHTHYLAMINE	134-32-7	52
NEPHROTOXINS		76
NEUROTOXINS		77
NEUROTOXINS		93
NICKEL	7440-02-0	114
NICOTINE	54-11-5	114
O-NITROANISOLE	91-23-6	14
6-NITROBENZO(A)PYRENE	63041-90-7	52
4-NITROPHENYLHYDROXYLAMINE	16169-16-7	52
NITROPRUSSIDE	13755-38-9	66
1-NITROPYRENE	5522-43-0	114
1-NITROPYRENE-CIS-4,5DIHYDRODIOL		52
1-NITROPYRENE-TRANS-4,5DIHYDRODIOL		53
10-NITROPYRENOL		53
3-NITROPYRENOL		53
4-NITROPYRENOL		53
5-NITROPYRENOL		53
6-NITROPYRENOL		53
8-NITROPYRENOL		53
9-NITROPYRENOL		53
P-NITROSOPHENETOLE	3420-97-1	53
PARATHION	56-38-2	115
PCB		115
PENAMS		95
PENTAMETHYLPARAROSANILINE	603-47-4	54
PERHYDROHISTRIONICOTOXIN	40709-29-3	95
PERMETHRIN	52645-53-1	115
PHENACETIN-D2		54
PHENOBARBITAL	50-06-6	54
PHENOBARBITOL	50-06-6	115
PHENOXYBENZAMINE	59-96-1	95
PHENYLAMINES		71
PHENYLENEDIAMINE		115
PHENYLEPHRINE		99
N-PHENYL-2-NAPHTHYLAMINE	135-88-6	14
PHOSGENE	75-44-5	115
3'-PHOSPHOADENOSINE-5'-PHOSPHOSULFATE		54
POLYCYCLIC HYDROCARBONS		77
PROGESTERONE	57-83-0	54
PROPANIL	709-98-8	54

558

STUDY TYPE INDEX

PHARMACOKINETICS/METABOLISM

CHEMICAL	CAS NO.	PAGE
PROPANOLOL	525-66-6	99
PUMILIOTOXIN		77
PYRILAMINE	91-84-9	54
PYRILAMINE	91-84-9	54
QUINAZOLINONES		95
RESERPINE	50-55-5	96
RESORCINOL	108-46-3	13
RETINOIC ACID AND ANALOGS		64
SAXITOXIN	35523-89-8	96
SCORPION VENOM		96
SELENIUM	7782-49-2	45
STRYCHNINE	57-24-9	96
SUCCINIMIDES		78
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE	57-68-1	54
SULFAMETHAZINE-N4-GLUCOSIDE		54
SULFAMETHAZINE-N4-GLUCURONIDE		54
SULFANILAMIDE	63-74-1	82
SULFITES		90
SUPROFEN		100
TERBUTALINE	23031-25-6	100
1,2,4,5-TETRACHLOROBENZENE	95-94-3	15
TETRACHLOROETHYLENE	127-18-4	117
TETRODOTOXIN	4368-28-9	96
THIOACETAMIDE	62-55-5	78
4,4'-THIOBIS-(6-T-BUTYL -CRESOL)	96-69-5	13
THIOCOLCHICINE	2730-71-4	78
THIOCOLCHICINE ANALOGS		78
THIORIDAZINE		100
TIMOLOL		100
TOBACCO SMOKE COMPONENTS		67
TRICHLOROACETONITRILE	545-06-2	117
1,1,1-TRICHLOROETHANE	71-55-6	15
1,1,1-TRICHLOROETHANE	71-55-6	13
TRICHLOROETHYLENE	79-01-6	117
TRIMETHYLOXONIUM	43625-65-6	96
TRIMETHYLTIN	56-24-6	55
TRIORTHOCRESYLPHOSPHATE	78-30-8	13
TRIPROLIDINE	6138-79-0	55
URANIUM-238		118
VALPROIC ACID	99-66-1	84
VALPROIC ACID (DIPROPYLACETIC ACID)		78
4-VINYL CYCLOHEXENE	100-40-3	15
VINYLIDENE FLUORIDE	75-38-7	15
VOLATILE ORGANIC DRINKING WATER CONTAMINANTS		118

PULMONARY TOXICITY

CHEMICAL	CAS NO.	PAGE
ACROLEIN	107-02-8	68
ACROLEIN	107-02-8	68
ACROLEIN	107-02-8	106
ADRIAMYCIN	23214-92-8	68
AEROSOLS		68
AMMONIUM SULFATE	7783-20-2	106
ASBESTOS	1332-21-4	68
AUTOMOBILE EXHAUST		68
BENZENE	71-43-2	107
BENZO(A)PYRENE		105
BERYLLIUM	7440-41-7	68
BIS-TRIBUTYL TIN OXIDE	56-35-9	117
BLEOMYCIN	11056-06-7	68
CADMIUM SULFATE	10124-36-4	107
CARBON TETRACHLORIDE	56-23-0	107
CHLORINE GAS	7782-50-5	68
CHLOROFORM	67-66-3	108
COFFEE DUST		68
COTTON DUST		68
CYCLOPHOSPHAMIDE (TOXIC METABOLITES)	50-18-0	68
DICHLOROBENZENE	106-46-7	109
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
ETHYL BENZENE	100-41-4	111
ETHYLENE OXIDE	75-21-8	111
HAZARDOUS AIR POLLUTANTS		112
KAOLIN	1332-58-7	69
KAOLIN	1332-58-7	69
METHYLENE CHLORIDE	75-09-2	113
METHYL ISOCYANATE	624-83-9	13
MONOCROTALINE		69
NICKEL	7440-02-0	114
NITROFURANTOIN	67-20-9	69
NITROFURANTOIN	67-20-9	69
NITROFURANTOIN	67-20-9	69
NITROGEN DIOXIDE	10102-44-0	114
NITROGEN DIOXIDE	10102-44-0	114
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OXYGEN	7782-44-7	69
OZONE	10028-15-6	69
OZONE	10028-15-6	115
OZONE	10028-15-6	115
OZONE	10028-15-6	115
PARAQUAT	4685-14-7	69
PARTICULATES		115
PEROXIDES		69
PHOSGENE	75-44-5	115
PHOSPHORAMIDE		69
POLYAMINES		69
PRIORITY AIR POLLUTANTS		116
RESPIRATORY SYSTEM TOXINS		70
SILICA	7631-86-9	70
SILICA	7631-86-9	70
STYRENE	100-42-5	116
STYRENE OXIDE	96-09-3	116
SULFUR DIOXIDE	7446-09-5	116
SULFUR DIOXIDE	7446-09-5	116
SULFURIC ACID	7664-93-9	117
TETRACHLOROETHYLENE	127-18-4	117
TOBACCO SMOKE		70
TOBACCO SMOKE		70
TOLUENE	108-88-3	117
TOLUENE DIISOCYANATE	26471-62-5	70
TRICHLOROETHANE	71-55-6	117
TRICHLOROETHYLENE	79-01-6	117
VANADIUM PENTOXIDE		58
WOOD STOVE EMISSIONS		118
P-XYLENE	106-42-3	118
XYLENES	1330-20-7	118

CHEMICAL	CAS NO.	PAGE
ACETONE	67-64-1	12
2-ACETYLAMINOFLUORENE	53-96-3	47
ACIFLUORFEN		106
ACRYLAMIDE	79-06-1	106
ADRIAMYCIN	23154-92-8	106
ALLYL CHLORIDE	107-05-1	47
AMPHOTERICIN B	1397-89-3	106
ARSINE		12
BENOMYL	17804-35-2	106
BIFENOX		107
BROMOFORM	75-25-2	12
BUPROPION		63
N-BUTYL ACETATE	123-86-4	48
N-BUTYL ACRYLATE	141-32-2	48
N-BUTYLCYCLOHEXANE		60
BUTYRIC ACID	107-92-6	107
CACODYLIC ACID	75-60-5	107
CADMIUM CHLORIDE	10108-64-2	107
CAFFEINE	58-08-2	107
CAPRYLIC ACID		107
CARBENDAZIM		107
CARBON TETRACHLORIDE	56-23-0	107
CHLORAMBUCIL	305-03-3	108
CHLORAMINE	10599-90-3	108
CHLORAZOL BLACK		108
CHLORINE (CHLORINATED DRINKING WATER)	7990-92-3	108
CHLORINE DIOXIDE	10049-04-4	108
CHLOROWAX 40	63449-39-8	48
CHLOROWAX 500C	63449-39-8	48
CLOMID		59
COAL LIQUEFACTION MATERIALS		105
COBALT CHLORIDE		109
CONGO RED		109
CYCLOPHOSPHAMIDE	50-18-0	109
1-DECANOL	112-30-1	58
DESIPRAMINE	56-47-5	63
DIAZO DYES		109
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	12
DIBUTYL PHTHALATE	84-74-2	109
DICHLOROACETONITRILE	3018-12-0	109
DICHLORODIPHENYLETHYLENE	72-55-9	12
2,4 DICHLOROPHENOXY ACETIC ACID	94-75-7	110
DIETHYL PHTHALATE	84-66-2	14
DIETHYLPHTHALATE	84-66-2	12
DIETHYLSTILBESTROL	56-53-1	59
DIMETHYLFORMAMIDE	68-12-2	49
DIMETHYLPHTHALATE	131-11-3	12
DIMETHYL PHTHALATE	131-11-3	14

CHEMICAL	CAS NO.	PAGE
M-DINITROBENZENE		110
4,6 DINITRO-O-CRESOL		110
DIPHENYL ETHERS		110
DIPHENYLHYDANTOIN	57-41-0	49
DIQUAT		110
DRINKING WATER CONTAMINANTS		111
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
ENVIRONMENTAL AGENTS		59
ETHANOL	64-17-5	66
2-ETHYLBUTYRIC ACID		111
ETHYLENE DIISOTHIOCYANATE		111
ETHYLENE GLYCOL	107-21-1	50
ETHYLENE GLYCOL DIETHYL ETHER	629-14-1	14
2-ETHYLHEXANOIC ACID	144-57-5	111
2-ETHYL HEXANOL	104-76-7	14
FD AND C RED NO. 40	25956-17-6	44
FD AND C YELLOW NO. 5	1934-21-0	44
5-FLUOROURACIL	51-28-8	50
GALLIUM ARSENIDE	1303-00-0	12
GENTAMYCIN	1403-66-3	56
GLYCOL ETHERS		12
GONADATROPIC RELEASING HORMONE ANALOGS		59
GONADOTROPIC RELEASING HORMONE (38 ANALOGS)		59
HALOACETONITRILES		111
HALOGENATED ACETONITRILES		111
HALOGENATED ETHANES		112
HEXACHLORO-BUTADIENE	87-68-3	14
HEXACHLORO-1,3-BUTADIENE	87-68-3	12
HEXANE	110-54-3	12
N-HEXANE	110-54-3	14
HUMIC ACID	1415-93-6	112
2-HYDROXY-BUPROPION		63
IRON CHLORIDE		112
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TYPE I, TRIGUTYLAMINE AS STABILIZER)	107-44-8	51
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TYPE II, DIISOPROPYLCARBOIIMIDE AS STABILIZER)	107-44-8	51
KARATHANE		112
LHRH ANTAGONISTS		60
LITHIUM		59
MANGANESE CHLORIDE		112
MERCAPTOMERIN		112
6-MERCAPTOPURINE	6112-76-1	56
6-MERCAPTOPURINE	6112-76-1	56
MERCURIC CHLORIDE	7487-94-7	112
METHOXYCHLOR		112
METHYLBENZENE	108-88-3	113

REPRODUCTIVE/DEVELOPMENTAL TOXICITY

CHEMICAL	CAS NO.	PAGE
2-METHYLBUTYRIC		113
METHYL ISOCYANATE	624-83-9	13
METHYL MERCURY	22967-92-6	113
MONO-ETHYL-HEXYL PHTHALATE	4376-20-9	14
NICKEL CHLORIDE		114
NICKEL CHLORIDE		114
NITROFEN	1836-75-5	114
NITROFEN ANALOGS		114
1-NONANOL	143-08-8	58
1-OCTANOL	111-87-5	58
ORAL CONTRACEPTIVES		61
OXYFLUORFEN		114
PCB'S		13
PENTOBARBITAL		57
PESTICIDES		115
PHENOBARBITAL	50-06-6	57
PHENYTOIN	57-41-0	57
PICLORAM	1918-02-1	115
PINACOLYL METHYLPHOSPHONOFLUORIDATE (SOMAN)		54
POLYCHLORINATED BIPHENYLS		14
POLYCHLORINATED BIPHENYLS		15
POLYCHLORINATED BIPHENYLS		14
POLYCHLORINATED BIPHENYLS		15
POLYCHLORINATED DIBENZODIOXINS		115
POLYDIMETHYLSILOXANE		54
PROCARBAZINE		116
PROPRANOLOL		57
RICIN	9009-86-3	77
SALICYLATES		57
SODIUM SALICYLATE	54-21-7	116
STYRENE	100-42-5	116
SULFAMETHAZINE	57-68-1	54
TAMOXIFEN		54
1,2,4,5-TETRACHLOROBENZENE	95-94-3	13
2,3,7,8-TETRACHLORO-DIBENZO-P-DIOXIN	1746-01-6	13
TETRAHYDROFURAN	109-99-9	15
TETRAHYDROFURAN	109-99-9	13
THEOPHYLLINE	58-55-9	15
TOXAPHENE		117
1,1,1-TRICHLOROETHANE	71-55-6	13
1,1,1-TRICHLOROETHANE	71-55-6	15
TRICHLORO-ETHYLENE	79-01-6	13
2,4,5-TRICHLOROPHENOL	95-95-4	117
2,4,6-TRICHLOROPHENOL4'NITROPHENYL ETHER		117
TRIPHENYLTIN	639-58-7	118
TRYPAN BLUE		118
VALERIC ACID	59546E104	118
VALPROIC ACID	59546E104	118

SUBCHRONIC TOXICITY

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	81
AMPHETAMINE	300-62-9	56
ANALGESICS		73
ANTIBIOTICS		85
ANTITRYPANOSOMAL COMPOUNDS		73
APPETITE SUPPRESSANTS		73
ARSENIC	7440-38-2	81
BENZENESULFONAMIDE,4-AMINO-N[5-CHLORO-2-QUINOXALINYL)](NSC-339004)		10
BRUCINE	357-57-3	107
BUPROPION		63
L-BUTHIONINE SULFOXIMINE		10
CARBON TETRACHLORIDE	56-23-0	107
CARBOXYLIC ACID		60
CARCINOGENS		81
CHLORAMINE	10599-90-3	108
CHLORINE DIOXIDE	10049-04-4	108
CHLOROBENZENE	108-90-7	108
2-CHLOROPHENOL	95-57-8	109
CHLOROPICRIN	76-06-2	109
COMFREY ROOT, DOMESTIC		44
DAUNORUBICIN	20830-81-3	56
DESIPRAMINE	56-47-5	63
DICHLOROACETIC ACID	79-43-6	109
DICHLOROBENZENE	106-46-7	109
1,2 DICHLOROBENZENE	95-50-1	109
1,2 DICHLOROETHANE	107-06-2	110
CIS-1,2 -DICHLOROETHYLENE	156-59-2	110
2,3-DICHLOROPROPANOL	616-23-9	110
2',3'-DIDEOXYADENOSINE (NSC-98700)	4097-22-7	10
2',3'-DIDEOXYCYTIDINE (NSC-606170)	7481-89-2	10
2,4 DIMETHYLPHENOL	105-67-9	110
1,5,2,4-DIOXADITHIEPANE, 2,2,4,4-TETRAOXIDE		10
DIPROPYLAMINE	142-84-7	110
DOXORUBICIN	23214-92-8	56
EPHEDRINE	299-42-3	56
EPICHLOROHYDRIN	106-89-8	111
ETHYLENE GLYCOL	107-21-1	111
ETHYL ETHER	60-29-7	111
FUROSEMIDE	54-31-9	75
GLUTARALDEHYDE	111-30-8	44
GOLD	7440-57-5	81
GOLD SODIUM THIOMALATE	39377-38-3	81
GOLD SODIUM THIOMALATE	39377-38-3	56
HYDRALAZINE	86-54-4	56
2-HYDROXY-BUPROPION		63
HYDROXYCHLOROQUINE	118-42-3	82
4-IPOMEANOL (NSC-349438)	32954-58-8	10
IPRONIAZID	54-92-2	76
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, TRIBUTYLAMINE AS STABLIZER)	107-44-8	51
O-ISOPROPYL METHYLPHOSPHONOFLUORIDATE (SARIN, DIISOPROPYLCARBOIIMIDE AS STABILIZER	107-44-8	51
ISOPROTERENOL	7683-59-2	56
LHRH ANTAGONISTS		60
LITHIUM		59
ISOINDOLO[1,2-B]QUINAZOLIN12-(10H)-ONE, 8-AMINO (NSC-SC-320846D)		10
6-MERCAPTOPURINE	6112-76-1	56
MERCURIC CHLORIDE	7487-94-7	56
METHOTREXATE	59-05-2	82
METHOTREXATE	59-05-2	82
METHYLDOPA	555-30-6	56
MINOXIDIL	38304-91-5	56
MONOCHLOROACETIC ACID	79-11-8	113
NEUROLEPTICS		103
NITROFURANTOIN	67-20-9	56
PHENYLPROPANOLAMINE	14838-15-4	57
PHENYTOIN	57-41-0	57
PHYLLANTHROSIDE	63166-73-4	10
PLATINUM, TETRACHLORO (1,2,CYCLO-HEXANEDIAMINE-N,N')-, [OC-6-22-(TRANS)]-(NSC-363812)		10
PRACTOLOL	6673-35-4	57
PROCAINAMIDE	51-06-9	57
PROPARGYL ALCOHOL		116
PROFRANOLOL	525-66-6	57
PSORALEN	66-97-7	82
PSYCHOTROPICS		103
PYRAZINE DIAZOHYDROXIDE (NSC-361456)		10
PYRIDINE	110-86-1	116
RHIZOXIN (NSC-332598)		10
SALICYLAZOSULFAPYRIDINE (SULFASALAZINE)	599-79-1	82
SELENIUM	7782-49-2	45
SULFAMIC ACID, 1,7-HEPTANEDYL ESTER (NSC-329680)		10
TERBUTALINE	23031-25-6	57
2,3,7,8-TETRACHLOROPHENOL		117
TETRAHYDROFURAN	109-99-9	117
THIOPHENOL		117
TRICHLOROACETIC ACID	76-03-9	117
1,2,3-TRICHLOROBENZENE	87-61-6	117
2,4,6-TRICHLOROPHENOL	88-06-2	117
1,2,3-TRICHLOROPROPANE	96-18-4	117
1,1,1-TRICHLOROPROPANONE		117
VALPROIC ACID (DIPROPYLACETIC ACID)		78
VERAPAMIL	52-53-9	57
VITAMIN E		45
XYLENES	1330-20-7	118

343

SYSTEMIC/ORGAN TOXICITY

CHEMICAL	CAS NO.	PAGE
ACETAMINOPHEN	103-90-2	73
ACETAMINOPHEN	103-90-2	47
ACETOETHYLTETRAMETHYLTETRALIN		44
ACETOLAMIDE		47
ACETOPHENETIDIN	62-44-2	71
ACRYLIC ACID ESTERS		12
ALUMINUM	7429-90-5	81
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		73
AMINOGLYCOSIDE ANTIBIOTICS		73
AMITRAZ	33089-61-1	106
AMPHETAMINE	300-62-9	56
ANALGESICS		73
ANESTHETICS		73
ANILINE		71
ANTHRACENE	120-12-7	44
ANTITRYPANOSOMAL COMPOUNDS		73
ARSENIC	7440-38-2	81
AZATHIOPRINE	446-86-6	81
BACTERIAL ENDOTOXIN		73
BARBITURATES		73
BENZODIAZEPINE		74
BENZYL ACETATE	140-11-4	11
BIS-TRIBUTYL TIN OXIDE	56-35-9	117
BROMOBENZENE	108-86-1	74
2-BUTOXYETHANOL	111-76-2	12
CADMIUM SULFIDE		97
CALCIUM CHANNEL BLOCKERS		12
CARBON MONOXIDE	630-08-0	107
CARBON TETRACHLORIDE	56-23-5	74
CARBON TETRACHLORIDE	56-23-0	107
CARCINOGENS		81
CHLORAMINE	10599-90-3	108
CHLORAMINE	10599-90-3	108
CHLORDECONE (KEPONE)	143-50-0	108
CHLORDIMEFORM	6164-98-3	108
CHLORINE (CHLORINATED DRINKING WATER)	7990-92-3	108
CHLORINE DIOXIDE	10049-04-4	108
CHLORINE DIOXIDE	10049-04-4	108
CHLOROPROMAZINE	50-53-3	81
CHOLERA TOXIN		74
CHOLERA TOXIN		74
COMFREY ROOT, DOMESTIC		44
CYCLOHEXAMINE	2201-15-2	66
CYCLOPHOSPHAMIDE	50-18-0	81
CYCLOVIR (ACV)	59277-89-3	97
DAUNORUBICIN	20830-81-3	56
DIBROMOCHLOROPROPANE	96-12-8	74
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	12
N-(3,5-DICHLOROPHENYL) SUCCINIMIDE		74
DIGITALIS		66
DIGITALIS		66
DIMETHYLNITROSAMINE	62-75-9	75
DIOXANE	123-91-1	44
DIPYRIDAMOLE	58-32-2	89
DOPAMINE	51-61-6	81
DOXORUBICIN	23214-92-8	56
ENERGY-RELATED MIXTURES		105
ENERGY-RELATED MIXTURES OXYGEN RADICALS		105
ENFLUREANE	13838-16-9	75
EPHEDRINE	299-42-3	56
EPICHLOROHYDRIN	106-89-8	75
ETHANOL		64
ETHANOL	64-17-5	66
ETHIONINE	13073-35-3	75
ETHYLENE DIBROMIDE	106-93-4	75
FUROSEMIDE	54-31-9	75
GALACTOSAMINE	7535-00-4	75
GENTAMICIN	1403-66-3	75
GENTAMICIN	1403-66-3	75
GENTAMICIN	1403-66-3	75
GOLD	7440-57-5	81
GOLDTHIOMALATE	39377-38-3	56
HALOTHANE	151-67-7	76
HEMATOPORPHYRIN		98
HYDRALAZINE	86-54-4	56
HYDROGEN PEROXIDE	7722-84-1	98
(3H)-N-HYDROXY-1-NAPHTHYLAMINE		51
(3H)N-HYDROXY-2-NAPHTHYLAMINE		51
IPRONIAZID	54-92-2	76
ISOPROTERENOL	7683-59-2	56
ISOPROTERENOL	7683-59-2	56
KANAMYCIN	59-01-8	99
LEAD		112
LEAD	7439-92-1	112
LEVODOPA	59-92-7	82
LIPOPOLYSACCHARIDE (E. COLI ENDOTOXIN)		76
MERCURIC CHLORIDE	7487-94-7	76
8-METHOXYPSORALEN	298-81-7	44
8-METHOXYPSORALEN	298-81-7	44
METHYLCHOLANTHRENE	56-49-5	76
METHYLDOPA	555-30-6	56
1-METHYL-4-PHENYL-1,2,3,6 TETRAHYDROPYRIDINE	28289-54-5	113
MINOXIDIL	38304-91-5	56
(3H)1-NAPHTHYLAMINE		52
(3H)2-NAPHTHYLAMINE		52

STUDY TYPE INDEX

SYSTEMIC/ORGAN TOXICITY

CHEMICAL	CAS NO.	PAGE
NEPHROTOXINS		76
NETILMICIN	56311-56-1	77
(3H)4-NITROBIPHENYL		52
NITROFURANTOIN	67-20-9	56
NITROFURANTOIN	67-20-9	69
NITROGEN DIOXIDE	10102-44-0	114
OCHRATOXIN A	303-47-9	77
OXAMIDE	471-46-5	53
OZONE	10028-15-6	115
D-PENICILLAMINE	52-67-5	57
PHALLOIDIN(E)	17466-45-4	77
PHENOBARBITAL	50-06-6	77
PHENYLALKYL AMINES		67
PHENYLAMINES		71
PHENYLHYDRAZINES		77
PHENYLPROPANOLAMINE	14838-15-4	57
PHENYLPROPANOLAMINE	14838-15-4	57
PHORBOL ESTERS		82
PICLORAM	1918-02-1	115
ANTI-PLATELET DRUGS		95
CIS-PLATINUM	15663-27-1	77
PRIORITY AIR POLLUTANTS		116
PSORALEN	66-97-7	82
QUINEBIDIMYL BENZILATE		95
RADIOGRAPHIC CONTRAST MATERIAL		67
TRANS-RETINOIC ACID	302-79-4	82
RETINOIC ACID AND ANALOGS		64
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
STREPTOZOTOCIN	18883-66-4	78
SUCCINIMIDES		78
SULFANILAMIDE	63-74-1	82
SULFAPYRAZINE	116-44-9	96
SUPEROXIDE ANION		100
TERBUTALINE	23031-25-6	57
TETRODOTOXIN	4368-28-9	67
THIOACETAMIDE	62-55-5	78
TOBRAMYCIN	32986-56-4	78
TOXIN B (CLOSTRIDIUM)		78
URANIUM-238		118
VALPROIC ACID (DIPROPYLACETIC ACID)		78
VERAPAMIL	52-53-9	57
VERAPAMIL	52-53-9	67
VINYLIDENE CHLORIDE	75-35-4	78
VITAMIN A	68-26-8	82
VOLATILE ORGANIC DRINKING WATER CONTAMINANTS		118
VOLATILE SOLVENTS		11
XYLENES	1330-20-7	118

APPENDIX

REQUESTS TO DHHS, DOE, AND EPA FOR INFORMATION ON TOXICOLOGY-RELATED RESEARCH

DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service

National Toxicology Program
P.O. Box 12233
Research Triangle Park, NC 27709

September 19, 1986

Dr. Murray Goldstein
Director
National Institute of Neurological
and Communicative Disorders and
Stroke
Building 31A, Room A52
National Institutes of Health
Bethesda, Maryland 20892

Dear Murray:

The Charter for the National Toxicology Program (NTP) requires an annual review of toxicology-related research supported by DHHS agencies as a part of the Annual Plan. The past six years this review also has included contributions by the Department of Energy and the Environmental Protection Agency, and we expect their continued participation. We are now in the process of preparing our ninth Annual Plan and would appreciate your assistance in providing us information for this review. I very much appreciate the past cooperation of your Institute in contributing to this effort. The reviews have been quite helpful not only to those of us responsible for the NTP, but to other Government agencies and the private sector as well.

The information requested (see enclosure) for this review is basically the same as that requested for FY 1986. Enclosed with this letter is an outline of the information requested and a Xerox copy of the FY 1986 review for your information. Data are requested for FY 1987, based on information available as of October 1986.

Please designate someone on your staff to work with Dr. Larry G. Hart, my assistant, who is responsible for preparing this review. Dr. Hart will contact him/her regarding further instructions and materials. Should there be any questions regarding this request, they may be directed to Dr. Hart on FTS 629-3971. In order to meet a second quarter objective for completion of the FY 1987 review, I would appreciate having your response by November 10, 1986.

Again, thank you for your cooperation in this important effort. With best personal regards.

Sincerely yours,

David P. Rall, M.D., Ph.D.
Director

0347

Enclosures

BEST COPY AVAILABLE

REQUEST FOR INFORMATION

FOR THE

REVIEW OF CURRENT RESEARCH RELATED TO TOXICOLOGY FOR THE NINTH (FY 1987) ANNUAL PLAN OF THE NATIONAL TOXICOLOGY PROGRAM

The Annual Plan of the National Toxicology Program includes a review of current research related to chemical toxicology. For the purpose of this review, toxicology is defined[1] in terms of:

Basic toxicology research -- studies which provide information on the adverse effects and fate of chemicals in biological systems including modifying factors. For example, studies which characterize the structure and/or function of biological systems are not appropriate for inclusion unless the objective of the studies is to provide a frame of reference or baseline for detecting or understanding alterations in structure and/or function as a measure of chemical toxicity. Studies on how exogenous chemicals may modify structure/function are appropriate. Similarly, studies on normal DNA synthesis should not be included, but studies on DNA repair mechanisms are included.

Toxiciology testing -- studies which provide information on the adverse effects of chemicals in biological systems using established test protocols. This includes chemicals being tested *in vitro* and *in vivo* in laboratory organisms as well as human epidemiological studies related to chemical exposure. Included are preclinical studies and Phase I clinical trials on the toxicity of chemotherapeutic agents. Studies dealing with adverse drug reaction are also appropriate for inclusion. It is recognized that in some instances "testing" for toxicological effects may be incidental to the main purpose of the project cited.

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[1] Specifically excluded from this definition is toxicology of physical environmental factors such as noise, light, ionizing and non-ionizing radiation, etc.

0348

Toxicology methods development -- studies aimed at developing and/or validating new methods, procedures, protocols, etc., for toxicology testing purposes.

The information requested is as follows (the tables and pages referred to are found in the Fiscal Year 1986 Review of Current DHHS, DOE, and EPA Research Related to Toxicology):

1. Please update, revise, correct and/or expand (as appropriate) the narrative information on pages 16-65 describing your agency's role in the support of basic toxicology research, toxicology testing, and toxicology methods development. A copy of the narrative for your agency from the FY 1986 Review is enclosed. The section on your agency should consist of a brief overview of your agency's role in these areas, followed by summaries of your agency's activities in support of basic toxicology research, toxicology testing, and toxicology methods development (see definitions).

2. Please provide an update of the budget data in Tables 1, 2 and 3 (pp. 5-9) for your agency, broken down into basic toxicology research, toxicology testing, and toxicology methods development. NTP agencies (NIEHS, FDA, CDC/NIOSH) should report all resources devoted to these three functions (including those assigned to the NTP) -- along with a separate break-out of NTP-assigned resources. These data should be obligations anticipated for FY 1987, based on the best information available to you as of October 1986.

3. Please provide an update of the manpower data in Tables 4 and 5 (pp. 10-13) for your agency, broken down into basic toxicology research, toxicology testing, and toxicology methods development. NTP agencies should report all manpower resources devoted to these

0349

three functions (including those assigned to the NTP) -- along with a separate break-out of NTP assigned resources. These data should be intramural professional staff-years anticipated for FY 1987, based on the best information available to you as of October 1986.

4. Please update, revise, correct and/or expand (as appropriate) the information reported in the FY 1986 Review (Chemical Compounds Currently Being Tested by DHHS, DOE, and EPA for Toxicological Properties, pp. 1-120) on your agency's efforts in toxicology testing. We have prepared double-spaced copies of the toxicology testing tables provided by your agency for last year's review and these are enclosed. We ask that you make your changes directly on the copies, using the blank pages only for addition of new chemicals.

   What is desired is a list of all chemicals being tested in research programs supported by your agency either in-house, or through grants or contracts. Although "testing" for toxicological properties may be incidental to the main purpose of the project cited, these chemicals or drugs should be included for information and reference purposes only. For each new chemical listed, please provide:

   - An asterisk identifying those chemicals being tested as part of the National Toxicology Program (NTP agencies only).

   - The appropriate CAS identification number for the chemical, if known.

   - Information on the type of test being conducted using one (or more, if appropriate) of the following codes:

No.	Test Type	Descriptions of Research
1	BC=	Biochemical/Cellular/Tissue Effects (includes general biochemistry, body burden studies, general pathology, and toxicologic mechanisms at molecular, cellular and tissue levels)
2	CE=	Clinical Toxicology/Epidemiology (includes both animal and human clinical and epidemiology studies)
3	CG-	Carcinogenesis
4	CT=	Chronic Toxicity* (includes general toxicology, adverse effects, side effects)
5	IT=	Immunologic Toxicity
6	MG=	Mutagenesis/Genetic Toxicity
7	NB=	Neurologic/Behavioral Toxicity
8	NS=	Nutritional Studies
9	PM=	Pharmacokinetics/Metabolism (especially of xenobiotics and their fate in biological systems, includes general pharmacology)
10	PT=	Pulmonary Toxicity
11	RD=	Reproductive/Developmental Toxicity
12	SC=	Subchronic Toxicity* (includes general toxicology, adverse effects, side effects)
13	SO=	Systemic/Organ Toxicity (except Reproductive/Pulmonary/Immunologic/Nervous Systems)
14	XX=	Other (Specify)

*Include one or both based on the definition of "subchronic studies" as being six months or less in duration while "chronic studies" are greater than six months in duration.

- Information on test status using the following code:

A = Test to be completed in FY 1987
B = On test in FY 1987
C = Test to be started in FY 1987
D = Selected for testing (date not yet determined)

- Information on the organizational unit (laboratory, contractor agency, or grantee) performing the research along with an appropriate identification number associated with the project.

5. Please update, revise, correct and/or expand (as appropriate) the information on pages 68-132 of the FY 1986 Review on your agency's efforts in toxicology methods development, using the format prescribed in this section. Copies of your agency's section on toxicology methods development are enclosed. Please make your changes directly on these copies, using the blank forms only for addition of new methods. This is a list of various toxicology test methods being developed in projects supported by your agency. For each new method listed, please provide:

   - An asterisk identifying those projects considered under the National Toxicology Program (NTP agencies only).

   - Information, in the form of appropriate headings, indicating the general type of method under development (e.g., short-term, long-term, *in vivo*, *in vitro*, etc.).

   - Information indicating the area of applicability of the test method under development (e.g., carcinogenesis, neurotoxicity, chronic toxicity, etc.).

   - An abbreviated summary of the method under development along with information identifying the performing organization and project number.

ANY QUESTIONS? CALL DR. LARRY HART
NIEHS
FTS 629-3971
COMMERCIAL (919) 541-3971

DEPARTMENT OF HEALTH & HUMAN SERVICES **Public Health Service**

National Toxicology Program
P.O. Box 12233
Research Triangle Park, NC 27709

September 19, 1986

The Honorable John S. Herrington
Secretary
Department of Energy
Washington, D.C. 20585

Dear Mr. Secretary:

I am writing to invite the Department of Energy's continuing participation in the annual National Toxicology Program's (NTP's) Review of Current DHHS, DOE, and EPA Research Related to Toxicology. We very much appreciate your Department's response to this request the past six years and look forward to your participation in the FY 1987 Review.

As you are aware, the National Toxicology Program was established in late 1978 to strengthen the Department of Health and Human Services' activities in the testing of chemicals of public health concern and in developing and validating new and better toxicology test methods. A major goal is to provide the information needed by Federal regulatory and research agencies which have responsibilities in the area of chemical toxicology. The NTP Charter requires this annual review of toxicology related research. The Review has been useful to a wide variety of organizations and individuals in Government and in the private sector.

The information requested for the FY 1987 Review will be basically the same as that requested for FY 1986. Enclosed with this letter is an outline of the information requested, and a copy of the FY 1986 Review for your information. Data are requested for FY 1987, based on information available as of October 1986. In order to meet a second quarter objective for completion of the FY 1987 Review, I would very much appreciate your completed response by November 10, 1986.

We would appreciate your designating a person on your staff to work with Dr. Larry G. Hart, my assistant, who is responsible for preparing this Review. Dr. Hart will contact him/her regarding further instructions and materials. Dr. James R. Beall was your contact last year. Should there be any questions regarding this request, please do not hesitate to contact Dr. Hart on FTS 629-3971.

Thank you for your continuing cooperation in this important effort. With best regards.

Sincerely yours,

David P. Rall, M.D., Ph.D.
Director

Enclosures

DEPARTMENT OF HEALTH & HUMAN SERVICES **Public Health Service**

National Toxicology Program
P.O. Box 12233
Research Triangle Park, NC 27709

September 19, 1986

Mr. Lee Thomas
Administrator
U. S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Lee:

I am writing to invite the Environmental Protection Agency's continuing participation in the annual National Toxicology Program's (NTP's) Review of Current DHHS, DOE, and EPA Research Related to Toxicology. We very much appreciate EPA's response to this request the past six years and look forward to your participation in the FY 1987 Review.

As you are aware, the National Toxicology Program was established in late 1978 to strengthen the Department of Health and Human Services' activities in the testing of chemicals of public health concern and in developing and validating new and better toxicology test methods. A major goal is to provide the information needed by Federal regulatory and research agencies which have responsibilities in the area of chemical toxicology. The NTP Charter requires this annual review of toxicology related research. The Review has been useful to a wide variety of organizations and individuals in Government and in the private sector.

The information requested for the FY 1987 Review will be basically the same as that requested for FY 1986. Enclosed with this letter is an outline of the information requested, and a copy of the FY 1986 Review for your information. Data are requested for FY 1987, based on information available as October 1986. In order to meet a second quarter objective for completion of the FY 1987 Review, I would very much appreciate your completed response by November 10, 1986.

We would appreciate your designating a person on your staff to work with Dr. Larry G. Hart, my assistant, who is responsible for preparing this Review. Dr. Hart will contact him/her regarding further instructions and materials. Should there be any questions regarding this request, please do not hesitate to contact Dr. Hart on FTS 629-3971.

Thank you for your continuing cooperation in this important effort. With best regards.

Sincerely yours,

David P. Rall, M.D., Ph.D.
Director

Enclosures

ADDRESSEES:

Dr. Vincent T. DeVita, Jr., Director
National Cancer Institute

cc: Dr. Adamson

Dr. David P. Rall, Director
National Institute of Environmental Health Sciences

Dr. Frank E. Young, Commissioner
Food and Drug Administration

Dr. James O. Mason, Director
Centers for Disease Control

Dr. J. Donald Millar, Director
National Institute for Occupational Safety and Health

Dr. Claude Lenfant, Director
National Heart, Lung, and Blood Institute

Dr. Anthony S. Fauci, Director
National Institute of Allergy and Infectious Diseases

Dr. Mortimer B. Lipsett, Director
National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases

Dr. Duane Alexander, Acting Director
National Institute of Child Health and Human Development

Dr. T. Franklin Williams, Director
National Institute on Aging

Dr. Harald Löe, Director
National Institute of Dental Research

Dr. Ruth L. Kirschstein, Director
National Institute of General Medical Sciences

ADDRESSEES (CONTINUED)

Dr. Murray Goldstein, Director
National Institute of Neurological and Communicative Disorders and Stroke

Dr. Carl Kupfer, Director
National Eye Institute

Dr. Betty H. Pickett, Director
Division of Research Resources

Dr. Robert Whitney, Director
Division of Research Services

Dr. Donald A. B. Lindberg, Director Designate
National Library of Medicine

Dr. Donald Ian Macdonald, Administrator
Alcohol, Drug Abuse, and Mental Health Administration

AGENCY CONTACTS*

Agency	Contact	Telephone Numbers
National Cancer Institute	Dr. Richard Adamson	(301) 496-6618
National Institute of Environmental Health Sciences	Dr. Larry Hart	(919) 541-3971
Food and Drug Administration	Dr. William T. Allaben	(501) 541-4211
Centers for Disease Control		
National Institute for Occupational Safety and Health	Dr. Janet Haartz	(513) 684-8465
Center for Environmental Health	Dr. Paul Stehr-Green	(404) 454-4682
National Heart, Lung, and Blood Institute	Ms. Henrietta D. Hyatt-Knorr	(301) 496-5031
National Institute of Allergy and Infectious Diseases	Ms. Mildred S. Warfield	(301) 496-6752
National Institute of Diabetes and Digestive and Kidney Diseases	Mr. John Gonda	(301) 496-1010
National Institute of Arthritis and Musculoskeletal and Skin Diseases	Ms. Peg Kerza-Kwiatecki	(301) 496-5521
National Institute of Child Health and Human Development	Ms. Sharon Bradley	(301) 496-1511
National Institute on Aging	Dr. Lot B. Page	(301) 496-1033

*For further information on an agency's entries in the Review

AGENCY CONTACTS* (CONTINUED)

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National Institute of General Medical Sciences	Dr. Leo H. von Euler	(301) 496-7891
National Institute of Neurological and Communicative Disorders and Stroke	Ms. Thelma Martin	(301) 496-9271
National Eye Institute	Mr. Julian M. Morris	(301) 496-4308
Division of Research Resources	Ms. Barbara N. Perrone	(301) 496-9269
Division of Research Services	Dr. Robert L. Dedrick	(301) 496-5771
National Library of Medicine	Dr. Henry M. Kissman	(301) 496-3147
Alcohol, Drug Abuse and Mental Health Administration	Dr. Peter Bridge	(301) 443-3838
Department of Energy	Dr. James R. Beall	(301) 353-4507
Environmental Protection Agency	Ms. Lynda Erinoff	(202) 382-5895

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*For further information on an agency's entries in the Review.

358

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**DEPARTMENT OF
HEALTH AND HUMAN SERVICES**

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